# BELARUS
# 1221.2/1221B.2
# 1221.3/1221.4

1221-0000010 PPC

## DISASSEMBLY-ASSEMBLY MANUAL

Minsk Tractor Works 2010

Due to continual improvement of manufactured articles, design of some assembly units and parts can be amended without being included in this publication.

Some technical data and figures given in this manual can differ from those actually installed on your tractor. Overall dimensions and values of mass are approximate (for reference purpose only). You can obtain more detailed information from your dealer of trade mark BELARUS.

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## CONTENTS

## INTRODUCTION

This manual contains procedure of disassembly-assembly of units and assemblies, data on their design and operation, adjustment and technical characteristics of units of tractors BELARUS 1221.2/1221B.2/1221.3/1221.4 with engines MMZ and Deutz. It is an indispensible guide for maintenance personnel engaged in repair or maintenance.

To obtain exhaustive information about tractors use this manual, as well as “Operating manual for tractor BELARUS 1221” and its modifications, enclosed with each tractor.

Data contained in this manual is accurate at the time of this manual compilation. As tractors BELARUS are continually updated, Minsk Tractor Works PA reserves the right to introduce design amendments without notifying the customers. All data given in this manual can be amended, and illustrative materials can differ from those describing tractors currently manufactured.

**ATTENTION!** Carefully study and strictly follow all directions given below in section **"Safety requirements"**.

**Abbreviations used:**

PTO – Power-take-off;
FPTO – Front power-take-off shaft;
FDA – Front driving axle;
GSB – Gear shifting box;
HHS – Hydraulic hinge system;
RHD – Rear hinge device;
FHD – Front hinge device;
HSC – Hydrostatic steering control;
SAC – Supercharged air cooler;
CC – Clutch coupling;
RA – Rear axle;
DI – Differential interlock;
TH – Trailer hitch;
SB – Storage battery.

## 1 SAFETY REQUIREMENTS

For your safety purpose carefully study this manual before starting maintenance and repair works. Pay particular attention to all warnings and recommendations given in this manual. Always consult operating and maintenance manual issued by the manufacturer.

1. Any equipment can present danger for personnel. Remember that careless steering or wrong maintenance can be the source of danger both for an operator and his associates.

2. Strictly follow safety regulations in handling lifting and transport mechanisms. Tractor lifted above the ground by means of lifting mechanisms and poorly fastened by ropes can fall down on you. Before jacking one of the axles, put the tractor on hard even surface. Another axle must be securely blocked with wedges (pads) put under wheels. Do not loll tractor against slag bricks, hollow tiles or other supports that can collapse by tractor weight. Do not work under tractor lifted only by jack, and observe all recommendations given in this manual.

3. Before starting to disassembly tractor into components, carefully clean adjacent assembly units from dust, mud, oil and grease.

4. When disengaging power transmission constituents, use disengagement tool. Securely put transmission constituents on supports and jacks. Do not rely solely on jacks to support tractor when working under it: tractor can move from jacks and injure or maim you, unless wheels are blocked with wedges on both sides. Always block front and rear wheels of tractor which must always be jacked. Always place raised section of tractor on supports before starting any work.

5. Make sure tractor will remain immobile: shift gear in the gear box, engage parking brake, shut down the engine and pull out key from starter switch and instruments. Disconnect storage battery to rule out possibility of starting engine by someone else, while you are working under tractor.

6. Wear suitable protective cloths (gloves, footwear, working cloths) and goggles.

7. Use serviceable and suitable tools. Self-made (provisional) tools and wrong work techniques can result in dangerous situation. Use mechanical tools only for loosening fasteners. Use proper size tools for tightening and loosening fittings. Do not use “inch system” tools for metric fasteners. Avoid possibility of injuring caused by wrench slippage.

8. To avoid burns take care when draining hot oil from filling tanks of hydraulic system, power transmission and FDA. Leaks of oil, lubricants, solvents and other liquids that can pollute environment and be harmful for your health must be properly disposed in accordance with local legislation and regulations.

9. Refill filling tanks and use only fuel, oils, lubricants and special liquids recommended by the manufacturer according to annexes “Recommended oils, fuels, lubricants and special liquids” listed in operating manuals for tractor and engine installed on it.

**DO NOT USE OTHER LUBRICANTS!**

10. For washing parts and assembly units use special washing agents.

When using kerosene or benzene for washing, observe fire safety regulations; make washing in ventilated premises.

Keep tidy working place where dismounting-mounting works are underway.

11. When checking travel of foot brakes' pedals, make sure travel of interlocked brakes' pedals is 90-110 mm with effort of 600 N.

12. Make sure clutch pedal has free travel and reliably returns to initial position. Pedal hang-up in intermediate positions and at free travel section is not allowed. Clutch must provide full disengagement, smooth engagement and not slip during operation.

13. Upon completion of repair works related to transmission run-in the tractor for 30 hours at all gears without load, or use for easy transport works.

**ATTENTION!** Remember that failure to follow above-listed recommendations can lead to major injuries and will depreciate your work!

## 2 GENERAL

Tractor BELARUS 1221 and its modifications belong to general purpose row-crop wheeled tractors of traction class 2 with axle arrangement 4 x 4. They are designed for various agricultural works with mounted, half-mounted, trailer machines and implements, loading-unloading mechanisms, driving stationary agricultural machinery, as well as transport works in different climatic regions.

These tractors are equipped with turbo supercharged six-cylinder diesel.

Tractor is configured according to classical approach. Tractor skeleton is frameless. On the front skeleton section on the bearer frame diesel is mounted, which is rigidly fastened to clutch coupling body via spacer.

In front of diesel the bar carries: water radiator of diesel cooling system, radiator of supercharged air intermediate cooling, condenser of cabin air conditioning (optional).

Straight behind the diesel power transmission mechanisms are arranged: clutch coupling (CC), gear box (GB), rear axle (RA) with differential interlock (DI), rear power-take-off shaft (PTO).

Clutch coupling – two-disk, friction of constantly closed type.

Gear box is mechanical, synchronized.

Rear axle has final drive, differential, side final drives.

Rear axle (RA) body houses: final drive, differential, final drives – a pair of cylindrical gears, rear PTO. On driving shafts of final drives foot brakes, parking brake and differential interlock coupling are installed.

Rear power-take-off (PTO) is synchronous (speed of PTO shank rotation depends on speed of tractor wheels rotation), and stand-alone (speed of PTO shank rotation doesn't depend on speed of tractor wheels rotation), two-speed (rotation speed of stand-alone PTO shank is 540 rev/min and 1000 rev/min). Three types of shanks can be installed: PTO 2 (21 splines), PTO 1c (8 splines), PTO 1c (6 splines) under State Standard GOST 3480. Direction of rotation – – clockwise on the side of shank end face.

Depending on tractor configuration or version, hydraulic mechanical or electrical hydraulic control of RA DI, FDA drive can be installed

Front driving axle (FDA) - BELARUS 1221 – with planetary-cylindrical wheeled reduction gears, self-interlocking differential, conical main drive.

Rear hinge mechanism (RHM) is a three-spot joint four-link device. HM (category 2) is designed for ganging up agricultural machinery and implements. RHM is mounted (installed) on rear axle cover and body.

Hydraulic hinge system – separate-aggregate with automatic adjustment of soil tillage depth. The system has 3 pairs of independent outputs.

Rear hinge mechanism HM-2 of make I according to State Standard GOST 10677 with adjustable right-side brace and internal interlock of lower connecting rod).

Rear hinge mechanism HM-2 of make I according to State Standard GOST 10677 with adjustable right-side brace and internal interlock of lower connecting rod.

Tractor has pneumatic drive to provide control of trailer brakes

Steering is hydrostatic (HSC); supply pump is of gear type, actuating mechanism – two hydraulic cylinders of two-way action.

Wheels with pneumatic low-pressure tires. Rear wheels – driving, front wheels – driving and guiding.

Size of main tires:

front wheels - 420/70R24;

rear wheels - 18.4R38.

The cabin is of protective design providing operator protection if tractor turns over in emergency situations (complies with requirements of ROPS). The tractor cabin is equipped with cleaner of front and rear glass, windscreen washer, rear view mirrors.

Natural ventilation is provided through side and rear windows, and hatch.

Fuel tank for tractors with hydraulic lift is made of plastic and is mounted under the cabin in the tractor middle section.

Diesel is closed with bonnet; for tractors BELARUS 1221.2/1221B.2 – from top without sides (metal); for tractors BELARUS 1221.3/1221.4 – with removable sides (plastic).

On customer' order tractor is equipped with additional equipment (spacers for installation of double wheels, speed reducer, air conditioner, canopy, etc.).

**NOTE:** All technical characteristics of tractor BELARUS 1221 and its modifications are given in Operating manuals for tractor and engine mounted on it, that are enclosed with each tractor.

## 3 DISMOUNTING AND MOUNTING OF ENGINE AND ITS SYSTEMS

### 3.1 Dismounting-mounting of engines MMZ and Deutz

**Dismounting-mounting engine MMZ, mounted on tractors BELARUS 1221.2/1221B.2/1221.3**

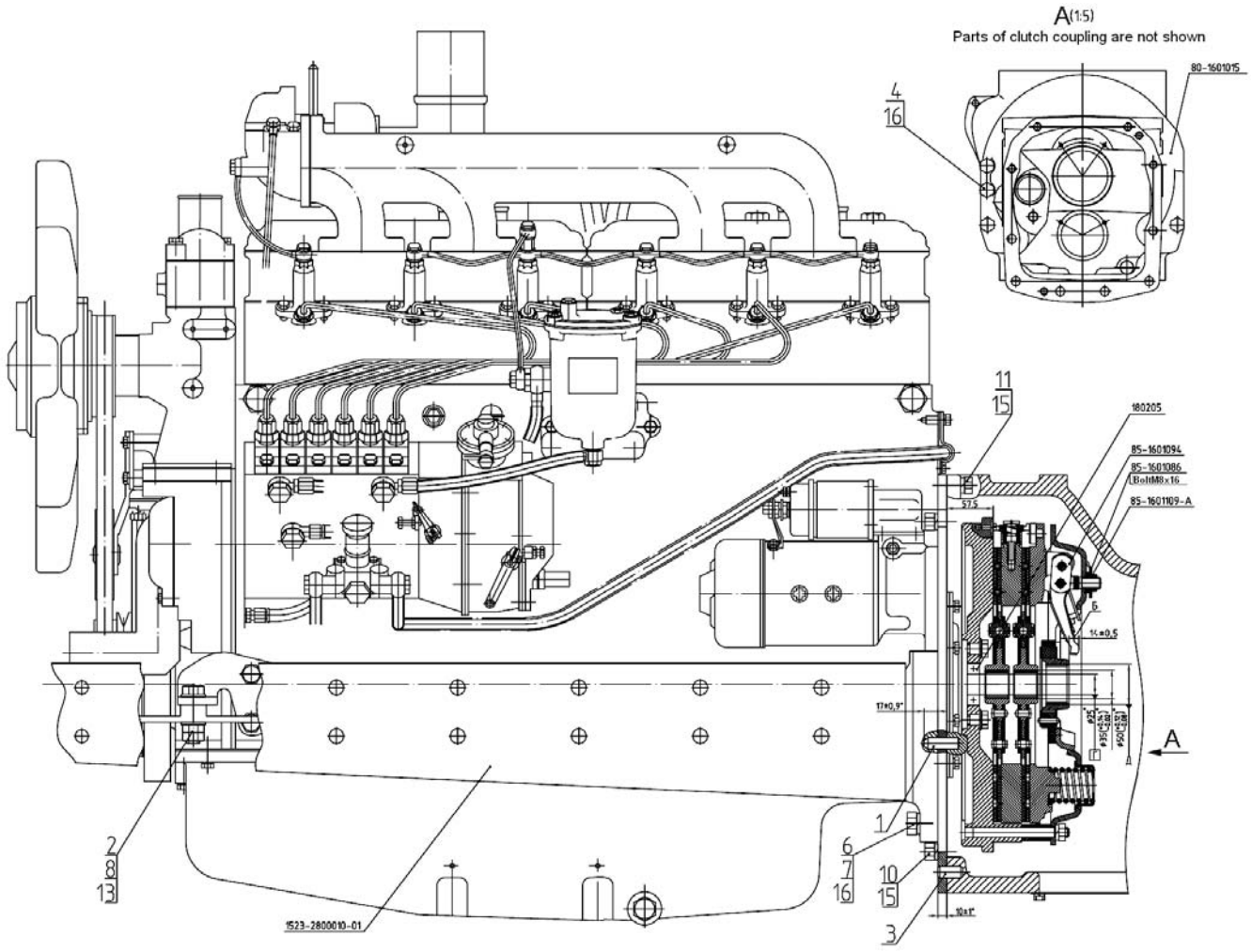



**Figure 3.1** Mounting engine (MMZ) on tractors BELARUS 1221.2/1221B.2/1221.3/1221.4

a) dismantle tractor facia, see section **8.2** “Dismounting-mounting of facia of tractor BELARUS 1221.2/1221B.2”;

b) drain cooling fluid from the tractor cooling system ;

c) drain oil from engine by having unscrewed plug in bottom section of engine pan

d) drain oil from HSC system, see section **7.1** “Disassembly-assembly of units of hydrostatic steering mounted on tractors BELARUS 1221.2/1221.3/1221.4 with engine MMZ”;

e) loosen silicon branch pipes of supercharged air cooler, see section **3.2** – “Dismounting supercharged air cooler (SAC), mounted on tractors BELARUS 1221.3” and section **3.3** – “Dismounting supercharged air cooler (SAC), mounted on tractors BELARUS 1221.4 with engine MMZ”;

f) dismantle engine harness:

1) for tractors BELARUS 1221.2/1221B.2, see section **11.1.1** “Dismounting elements of engine electrical equipment (MMZ) mounted on tractors BELARUS 1221.2/1221B.2”;

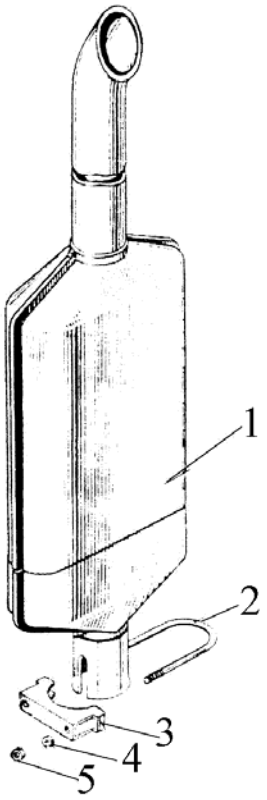
2) for tractors BELARUS 1221.3, see sections:

- **11.5.4** “Operations performed when replacing engine”;
- **11.6.1** “Operations performed when replacing engine”;
- **11.7.1** “Operations performed when replacing engine”;

g) for tractors BELARUS 1221.4 with engine MMZ, see section **11.10.1** “Operations performed when replacing engine”;

h) disconnect branch pipes of water radiator from engine, see section **3.7** “Dismounting-mounting the cooling system, mounted on tractors BELARUS 1221.2/1221B.2/1221.3”;

i) dismount muffler 1 (Figure 3.2) by loosening nuts 5 and releasing collar 3;




1 – muffler; 2 – grip; 3 – collar; 4 – washer; 5 – nut.

**Figure 3.2** Muffler

j) disconnect fuel lines from coarse fuel filter 6 (Figure 3.3), installed only on tractor BELARUS 1221.4 with engine MMZ;

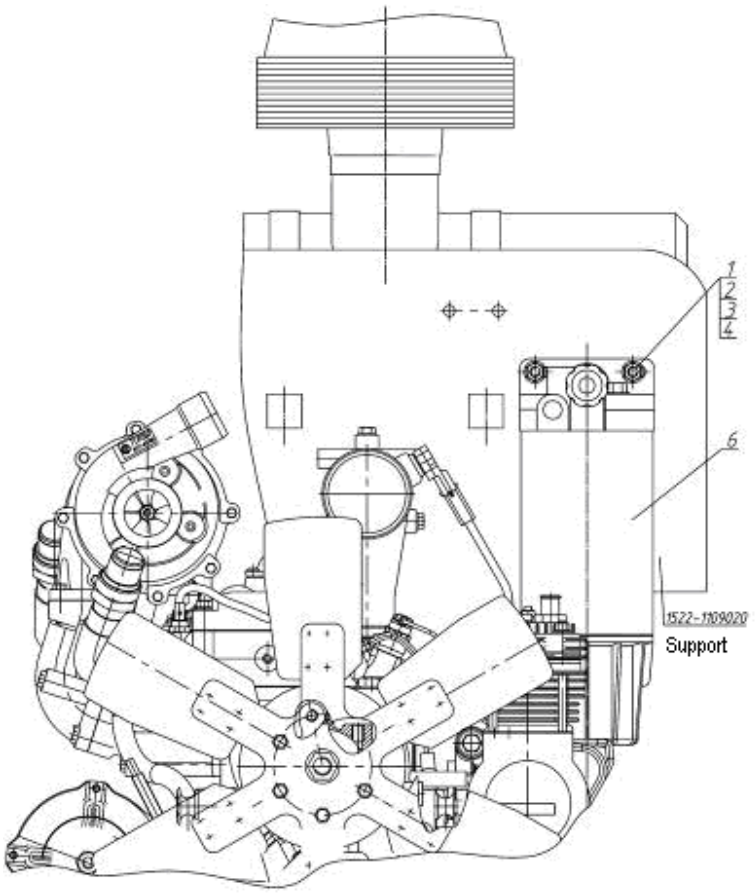


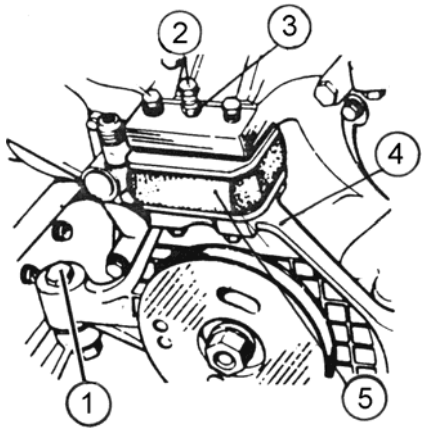

**Figure 3.3** Mounting coarse fuel filter on MMZ.

k) dismantle air purifier, as described in section **3.9** “Disassembly-assembly of air purifier unit installed on tractors BELARUS 1221.2/1221B.2/1221.3/1221.4 (with engine MMZ)”;

l) dismantle HSC metal oil pipes, 11, 12 by disconnecting them from high-pressure sleeves see (Figure 7.1), section **7.1** “Disassembly-assembly of hydrostatic steering controlunits mounted on tractors BELARUS 1221.2/1221.3/1221.4 with engine MMZ”, or (Figure 7.6), section **7.1.2** «”Disassembly-assembly узлов of hydrostatic steering controlsystem mounted on tractors BELARUS 1221B.2”;

n) dismantle cardan shaft of FDA drive;

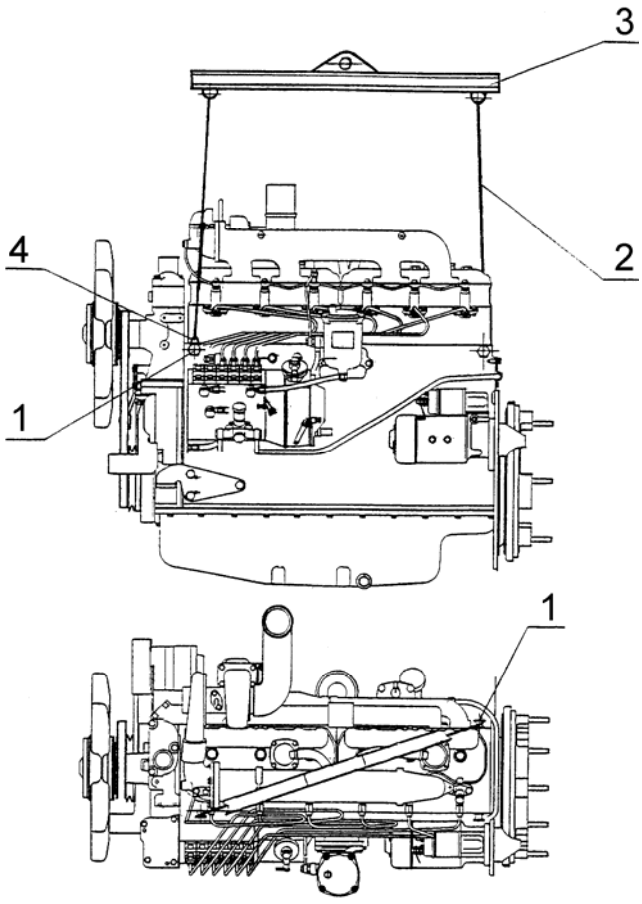
n) disconnect front engine support from front bar, having unscrewed bolts 1 (Figure 3.4) (only for engines MMZ);




1- support fastening bolt; 2- adjustment bolt; 3- check nut; 4- support; 5- shock absorber

**Figure 3.4** Front engine support

o) connect lifting mechanism to diesel, for slinging diagram see (Figures 3.5);




1 – eye bolt; 2 –steel rope (chain); 3 – beam; 4 – grip**;**

**Figure 3.5** Diagram of slinging diesel MMZ

p) separate front driving axle together with spars and radiators from tractor and roll it away from diesel;

**ATTENTION!** To prevent turning over of front axle take off ballast loads or put supports under them.

q) unscrew bolts 10, 11 (Figure 3.1) that fasten rear diesel sheet to clutch body, disconnect diesel having pulled it forward until clutch coupling goes out of clutch body bell, and raise it using lifting mechanism;

**Make assembly** in reverse order, having fulfilled the following requirements:

Torques for threaded connections that are not given correspond to class II under Industry Standard STP 212-2226-2006.

Before mounting the engine make adjustment of clutch, see section **4.3.2** “Disassembly-assembly of clutch coupling’”;

After installation of engine on tractor torque:

a) torque bolts 4, 6, 7 (Figure 3.1) for fastening semi-frame 1523-2800010-01 to clutch body 80-1601015 to 160...200 N·m;

b) torque bolts 10, 11 (Figure 3.1) for fastening rear engine sheet to clutch body to 70...80 N·m;

c) torque bolts 8 (Figure 3.1) for fastening engine to 160...200 N·m.

**Dismounting-mounting engine Deutz, mounted on tractors BELARUS 1221.4**

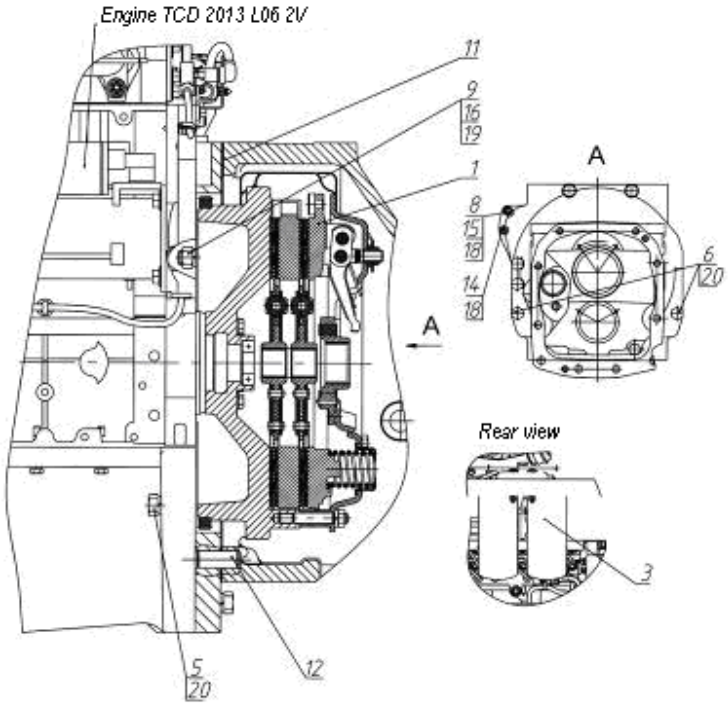



**Figure 3.6** Mounting engine (Deutz) on tractor BELARUS 1221.4

a) Dismantle tractor facia, see section **8.3** “Dismounting-mounting facia of tractor BELARUS 1221.3/1221.4”;

b) drain cooling fluid from tractor cooling system;

c) drain oil from engine, having unscrewed plug in lower section of engine casing;

d) drain oil from HSC system, see section **7.1.1** “Disassembly-assembly of hydrostatic steering controlunits mounted on tractors BELARUS 1221.4 with engine Deutz”;

e) loosen silicon branch pipes of supercharged air cooler , as described in section **3.4** – “Dismounting supercharged air cooler (SAC), mounted on tractors BELARUS 1221.4 with engine Deutz”;

e) dismount engine harness, see sections:

**11.8.1** “Operations performed when replacing engine”;

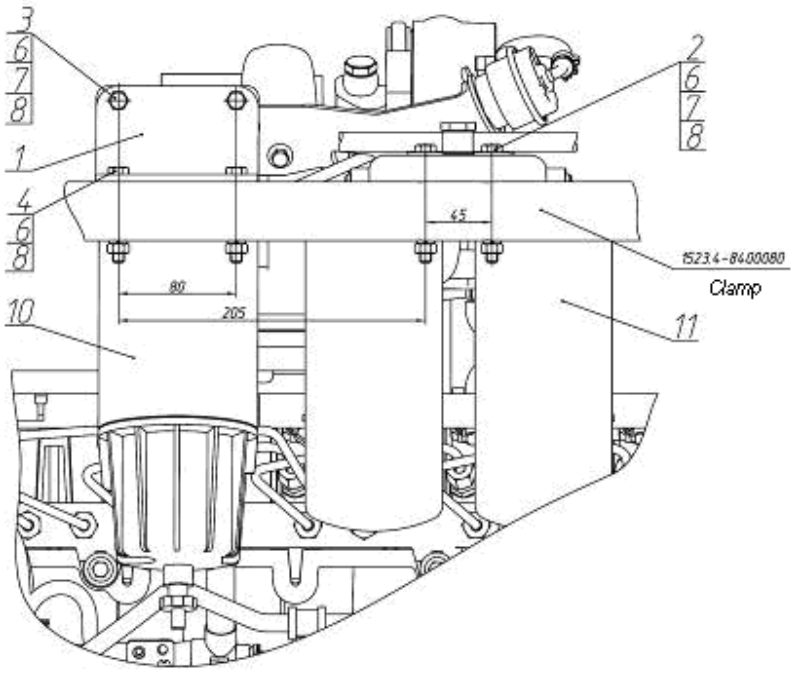
**11.9.1** “Operations performed when replacing engine”;

f) disconnect water radiator branch pipes from engine, as described in section **3.6** “Dismounting-mounting cooling system mounted on tractors BELARUS 1221.4 with engine Deutz”;

g) disconnect condenser and drive of air conditioner compressor (depending on configuration), see section **8.8** “Dismounting-mounting air conditioner (optional) on tractors BELARUS 1221.3/1221.4”;

h) dismantle outlet pipe, as described in section **3.11**”Disassembly-assembly of exhaust system of tractors BELARUS 1221.4”;

j) disconnect fuel lines from coarse fuel filter 10 (Figure 3.7);




1-arm; 2, 3, 4-bolts; 10- coarse fuel filter; 11- double fine fuel filter.

**Figure 3.7** Installation of coarse and fine fuel filters on Deutz

i) dismantle air purifier, as described in section **3.10** “Disassembly-assembly of air purifier unit mounted on tractors BELARUS 1221.4 Deutz”;

l) dismantle HSC oil lines 8, 5 (Figure 3.8) and undock from engine oil lines 10 by dismounting brace 9;

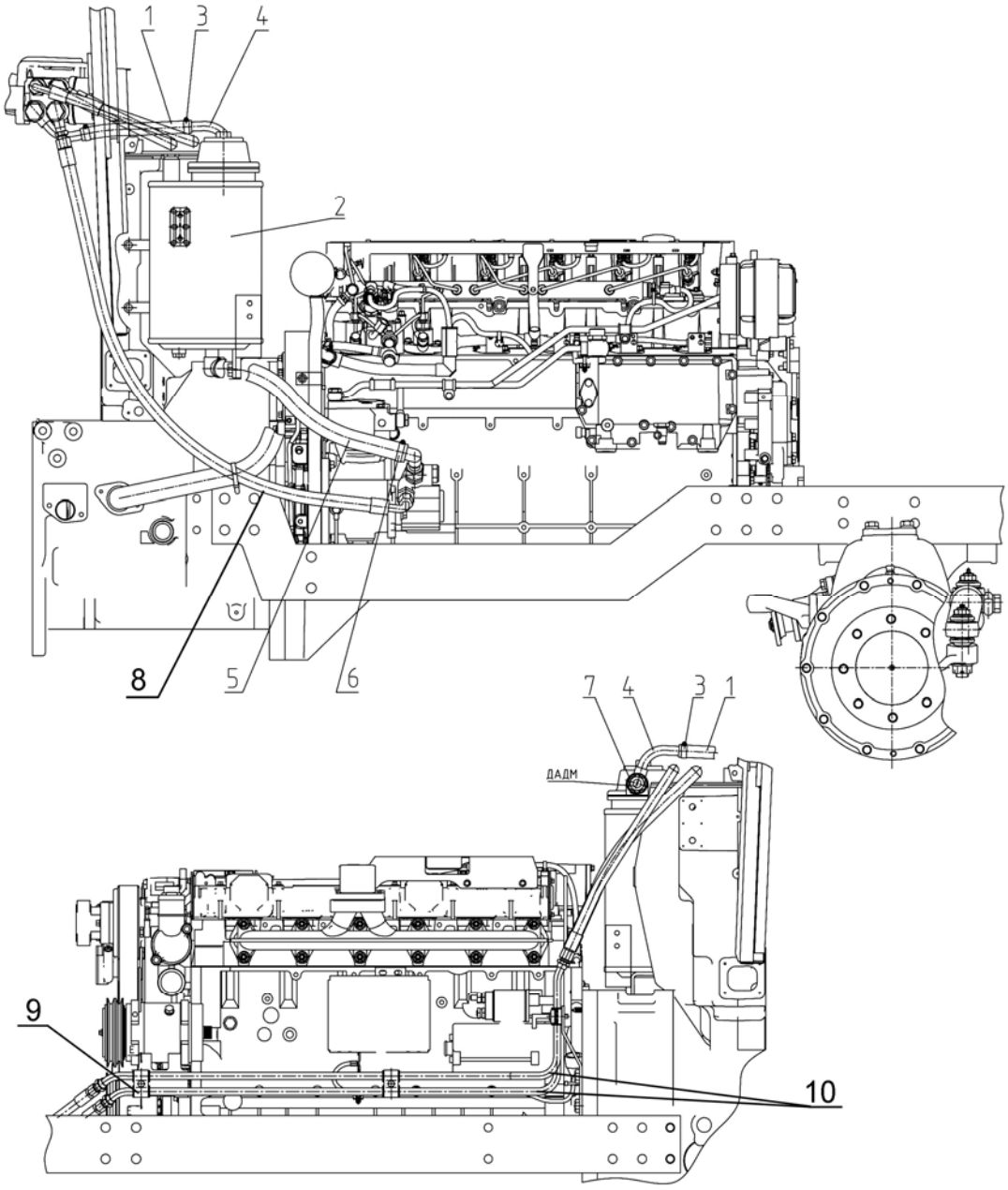
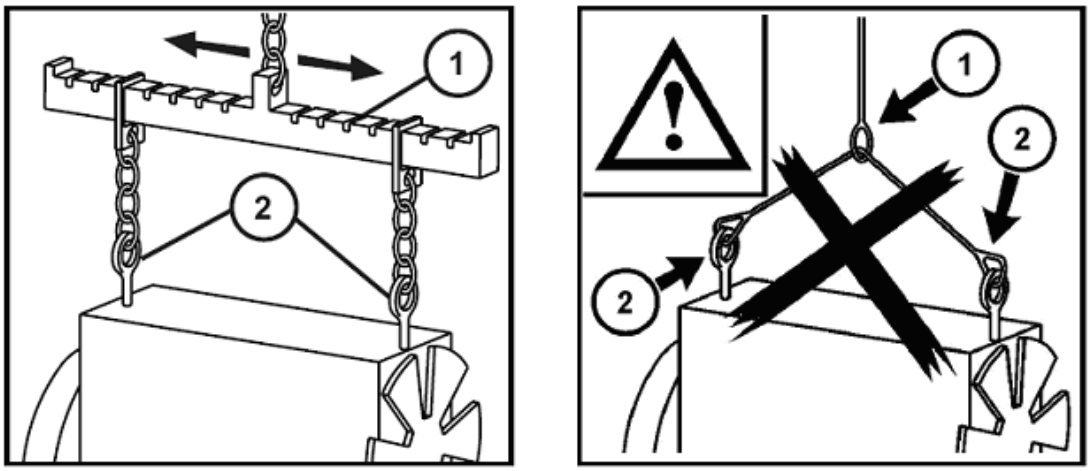



**Figure 3.8** HSC Deutz

m) dismantle cardan shaft of FDA drive;

n) connect lifting mechanism to diesel, for slinging diagram see (Figure 3.9);

o) disconnect front bar from engine, as described in section **10.3** “Disconnecting front bar from engine Deutz”;




**Suspension appliance**

- Use only proper suspension appliance to handle the engine.

- Suspension appliance (1) must be adjusted to engine gravity centre.

- After transportation/before engine start-up dismount transportation eyelets (2).

**Dangerous for life!**
**Wrong suspension can result in engine turn over or drop!**

- Fastening device may not be securely fixed under gravity centre (1)
- Fastening device may slip, engine is swinging aside (1).
- Two short fastening device leads to transport fixture bending (2) and can damage it.

**Figure 3.9** Diagram of slinging engine Deutz

p) undock FDA with front bar and radiators from tractor, and roll it aside from diesel;

**ATTENTION!** To prevent FDA turning over remove ballast loads or put supports under them.

q) unscrew bolts (Figure 3.6) that fasten rear diesel sheet to clutch body, disconnect diesel having pulled it forward until clutch coupling goes out of clutch body bell, and raise it using lifting mechanism;

**Make assembly** in reverse order, having fulfilled the following requirements:
a) torque threaded connections of bolts 5 and 6 (Figure 3.6) to 350…380 N·m;
b) torque threaded connections 9 (Figure 3.6) to 220…250 N·m;
c) torque threaded connections 8 (Figure 3.6) to 160…200 N·m;
d) Torques for threaded connections that are not given correspond to class II under Industry Standard STP 212-2226-2006

### 3.2 Dismounting of supercharged air cooler (SAC), mounted on tractors BELARUS-1221.3

a) loosen collars 2 (Figure 3.10) and shift heat-resistant silicon branch pipes 3 off air conduits 1 and cooler 8;

b) unscrew bolts 4, 5, 7 that fasten cooler to water radiator and air conduit to inlet collector, remove cooler, air conduit and spacer 6.

Make mounting in reverse sequence.

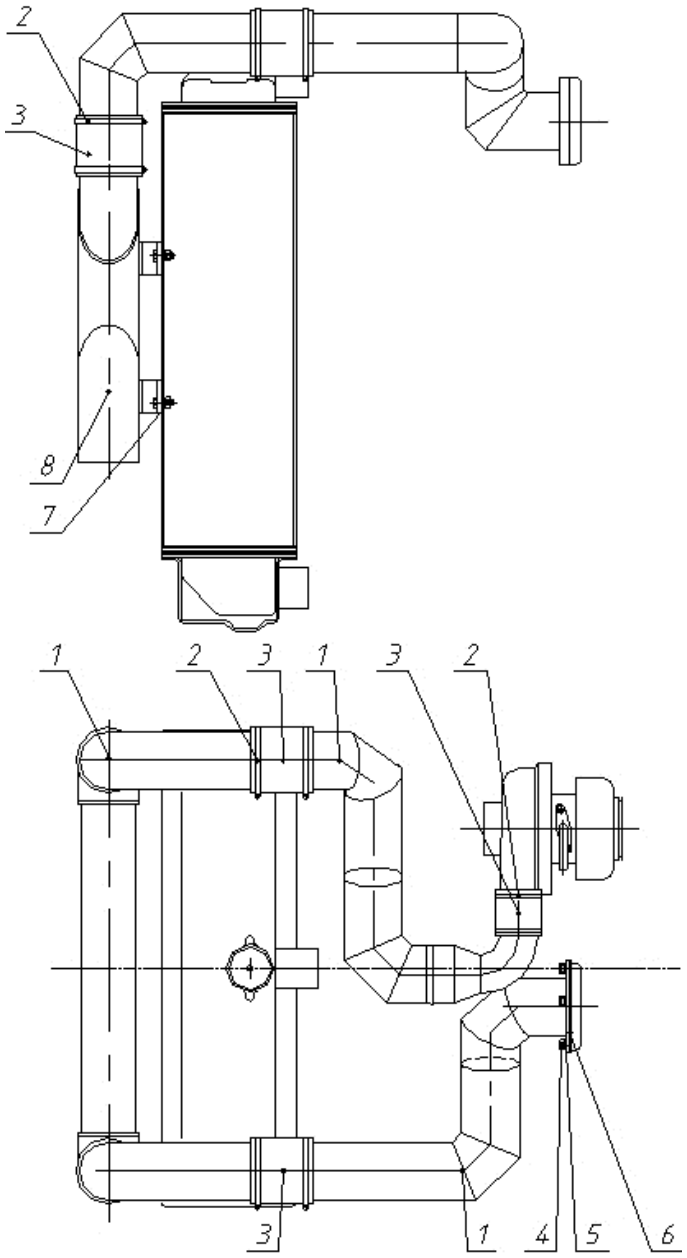
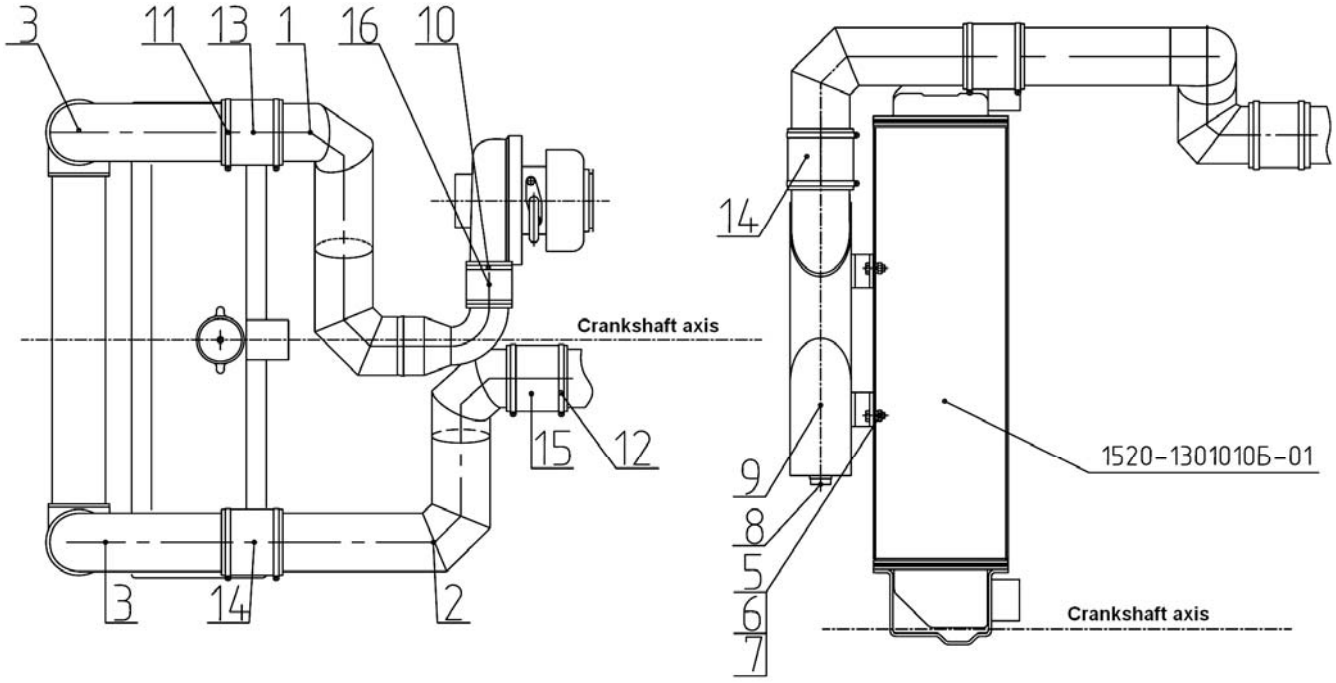



**Figure 3.10**

### 3.3 Dismounting of supercharged air cooler (SAC), mounted on tractors BELARUS-1221.4 with engine MMZ

a) loosen collars 10, 11, 12 (Figure 3.11);
b) shift heat-resistant silicon branch pipes 13, 14, 15, 16 off air conduits 1, 2, 3 and supercharged air cooler 9;
c) unscrew bolts 5 that fasten supercharged air cooler to water radiator and dismantle the cooler.

Make mounting in reverse sequence




1, 2, 3 – air conduit; 5 – bolt; 6 – nut; 7 – washer; 8 – plug; 9 – supercharged air cooler; 10, 11, 12 – collars; 13, 14, 15, 16 – silicon branch pipes.

**Figure 3.11** Supercharged air cooler.

**3.4 Dismounting of supercharged air cooler (SAC), mounted on tractors BELARUS-1221.4 with engine Deutz**

a) loosen collars 12 (Figure 3.12) and shift heat-resistant silicon branch pipes 5, 14, 15 off air conduits 1, 2, 3 and supercharged air cooler 16;
b) unscrew bolts fastening the cooler to water radiator and dismantle the cooler.

Make mounting in reverse sequence.

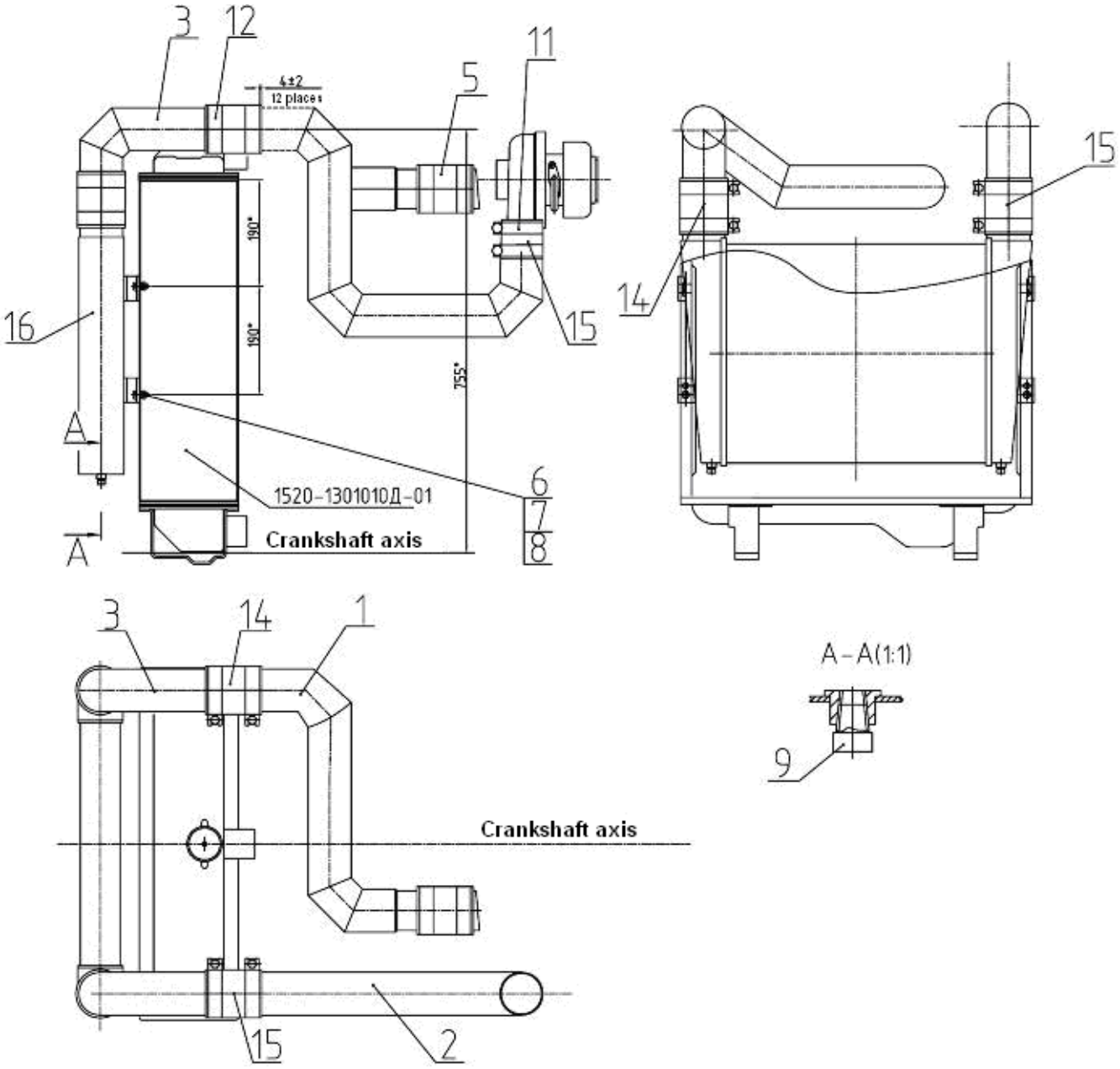
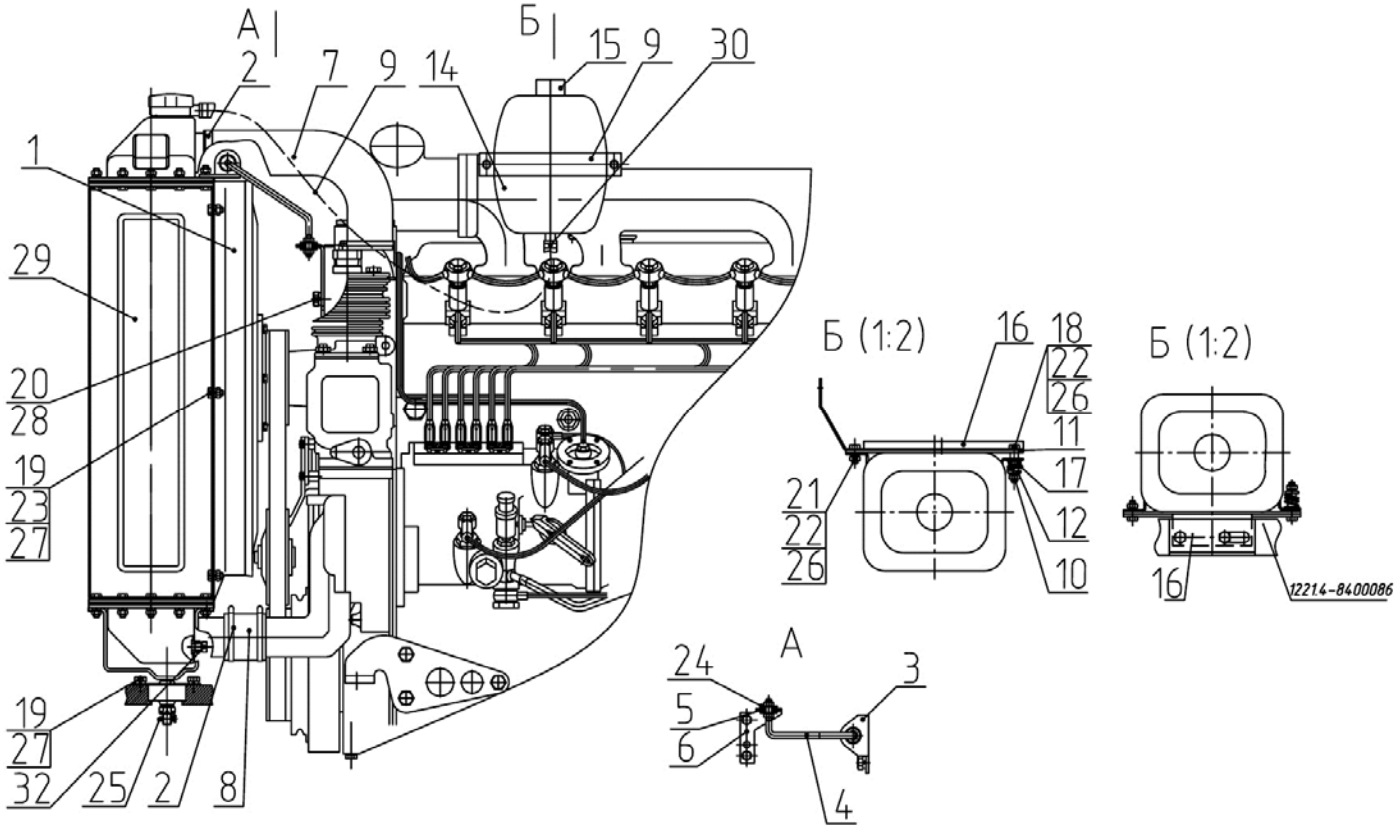



**Figure 3.12**

**3.5 Dismounting-mounting of cooling system mounted on tractors BELARUS-1221.4 with engine MMZ**

a) drain cooling fluid from tractor cooling system;
b) untignten collars 2 (Figure 3.13) and disconnect hoses 7, 8;
c) unscrew three bolts 18, 21 and dismantle expansion tank 14;
d) dismantle SAC, as described in section **3.3** “Dismounting supercharged air cooler (SAC), mounted on tractors BELARUS-1221.4 with engine MMZ”;
e) disconnect wires of terminal carrier socket, if installed, on fan diffuser 1;
f) unscrew six bolts 19 of fan diffuser 1 and disconnect diffuser;
g) disconnect arm 3 from engine and arm 6 from radiator 29;
h) extract extension 4 with arms 3 and 6;
j) unpin and unscrew two crown nuts that fasten radiator 25.




1, 2, 3, 4 – sealant; 5 – fan housing; 8 – arm; 9 – extension; 10, 11 – arm; 12 – collar; 13 – bushing; 14 – plate; 15 – dish; 16 – expansion tank; 17 – plug; 18 – shock absorber; 20, 21 – hose; 22 – pipe; 23 – spring; 24, 25, 27, 28 – bolt;, 29 – screw; 30, 31 – nut; 33, 36, 37 – washer; 35 – cotter pin; 38 – plug; 39, 40 – collar “Norma” TORRO; 42 – water radiator; 43 – sleeve.

**Figure 3.13** Mounting water radiator

**3.6 Dismounting-mounting of cooling system mounted on tractors BELARUS-1221.4 with engine Deutz**

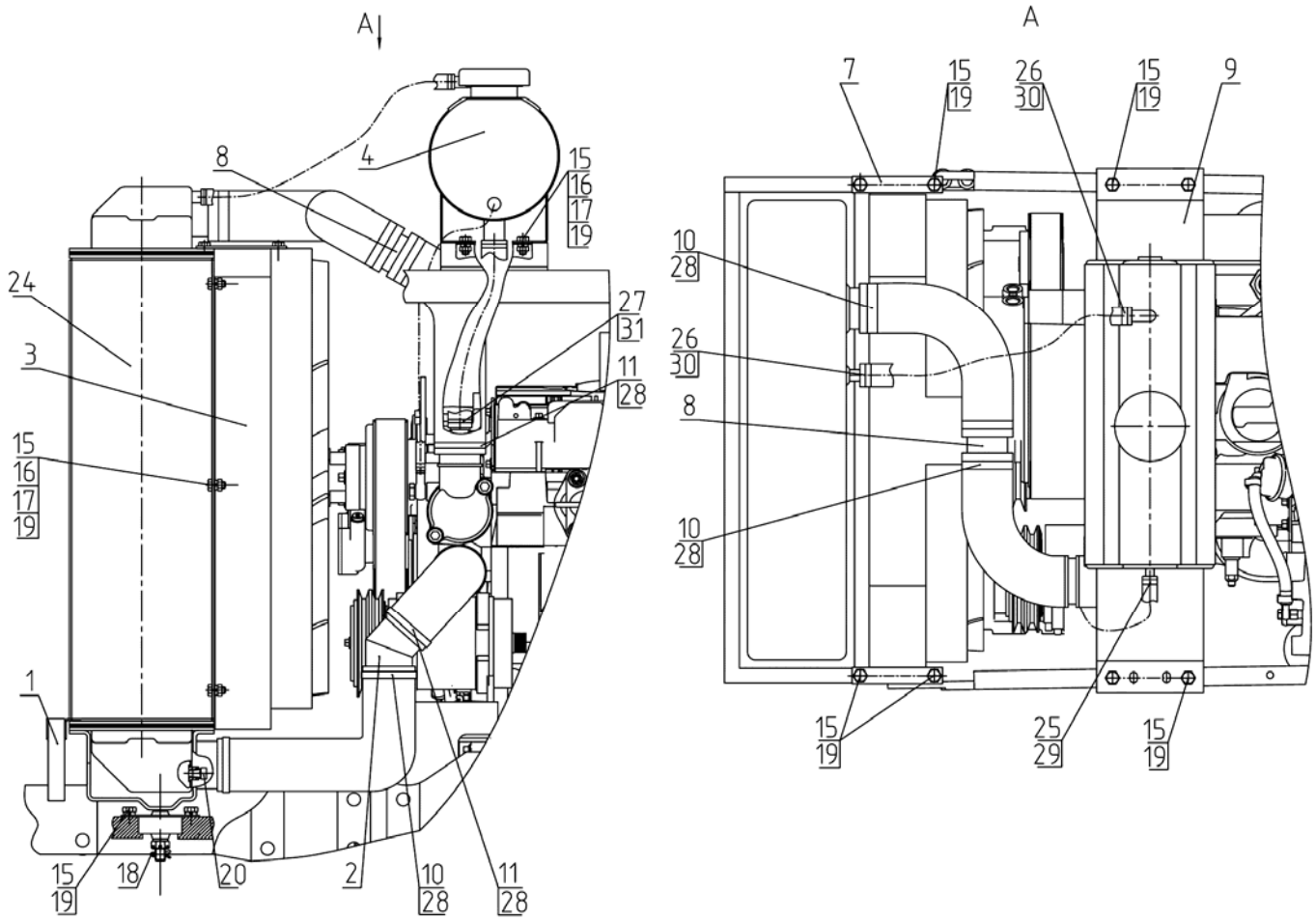



**Figure 3.14** Cooling system

a) drain cooling fluid from tractor cooling system;
b) disconnect hose 10, sleeves 29, 30, 31 from radiator 24 (Figure 3.14);
c) unscrew two bolts 15 and dismantle expansion tank 4;
d) dismantle SAC, see section **3.4** “Dismounting supercharged air cooler (SAC), mounted on tractors BELARUS-1221.4 with engine Deutz”;
e) disconnect sealant 1 from radiator 24, having unscrewed four nuts;
f) disconnect wires of terminal carrier socket, if installed, on fan diffuser;
g) unscrew four bolts 15 of fan diffuser 3 and disconnect diffuser;
h) disconnect plates 7, connecting radiator 24 with hood frame;
j) unpin cotter pins 18 and unscrew two crown nuts for fastening radiator;
i) dismantle radiator 24;

### 3.7 Dismounting-mounting of cooling system mounted on tractors BELARUS-1221.2/1221B.2/1221.3 with engine MMZ

a) drain cooling fluid from tractor cooling system;
b) untighten collars 7 (Figure 3.15) or 49, 48 and disconnect hoses 14, 16, 26;
c) unscrew three bolts 31, 32, 33 and dismantle expansion tank ок 24;
d) disconnect wires of terminal carrier socket, **if installed**, on fan diffuser 6;
e) disconnect arm 12 from engine and arm 11 from radiator 47;
f) extract extension 13 with arms 11, 12;
g) unscrew four bolts 33 of fan diffuser 6 and disconnect diffuser;
h) unpin and unscrew two crown nuts for fastening radiator 47;
j) dismantle radiator with sealants 1, 3, 4, 5;
i) disconnect sealant 1, 3, 4, 5 from radiator 47, having unscrewd four nuts.

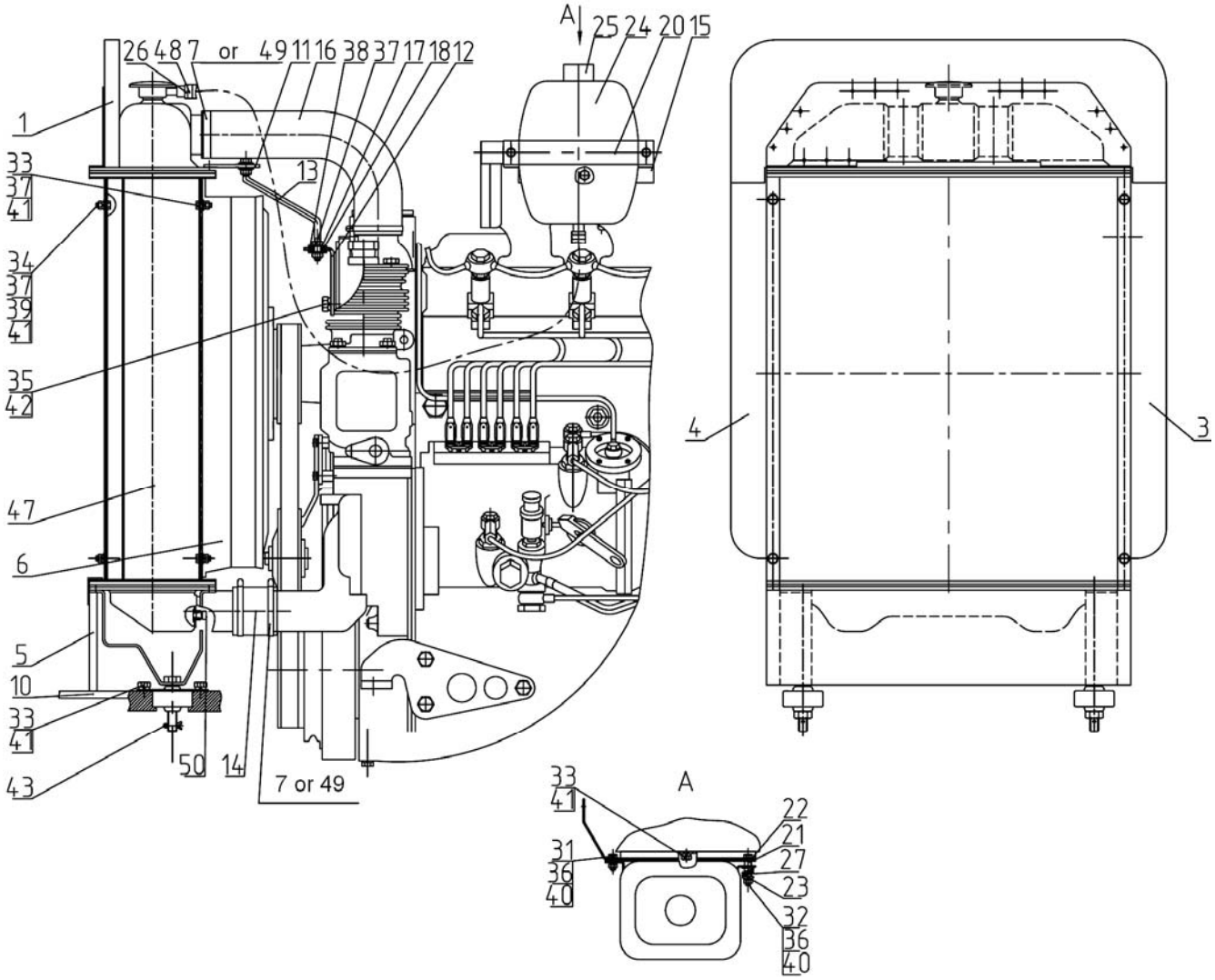



**Figure 3.15** Cooling system

### 3.8 Disassembly-assembly of fuel tank 1221-1101500, mounted on tractors BELARUS-1221.2/1221B.2/1221.3/1221.4 with engines MMZ and Deutz, with two cylinders of lift linkage (hydraulic lift of the hydraulic system)

1) drain diesel fuel out of tank 22 (Figure 3.16) via draing point 30;
2) dismantle draining point 30;
3) dismantle ball 29;
4) dismount tractor rear left-side wheel;
5) remove cover (plug) 25 of fuel tank;
6) remove chain 26;
7) unscrew bolt 28 for fastening neck 31;
8) unscrew collars 32;
9) dismantle pipe 24;
10) dismantle neck 31;
11) remove collars 32 and branch pipe 33;
12) dismantle angle 23;
13) dismantle fuel intake 18;
14) remove washers (19) and fuel line 17;
15) dismantle point bolt 16;
16) remove washers 15 and fuel line 14;
17) unscrew nuts 3 fastening collars 21;
18) dismantle collar 21, remove sealant 20 from it;
19) unscrew screws 7;
20) remove collars 6;
21) dismantle fuel tank 22;
22) unscrew screws 13;
23) dismantle fuel sensor 10;
24) unscrew bolts 5 fastening arms 2;
25) dismantle arms 2;
26) remove rubber profiles 1 from arms 2.

Perform assembly in reverse sequence.

**NOTE:** When mounting fuel intakes 16, 18 and 23, grease threaded section with sealant.

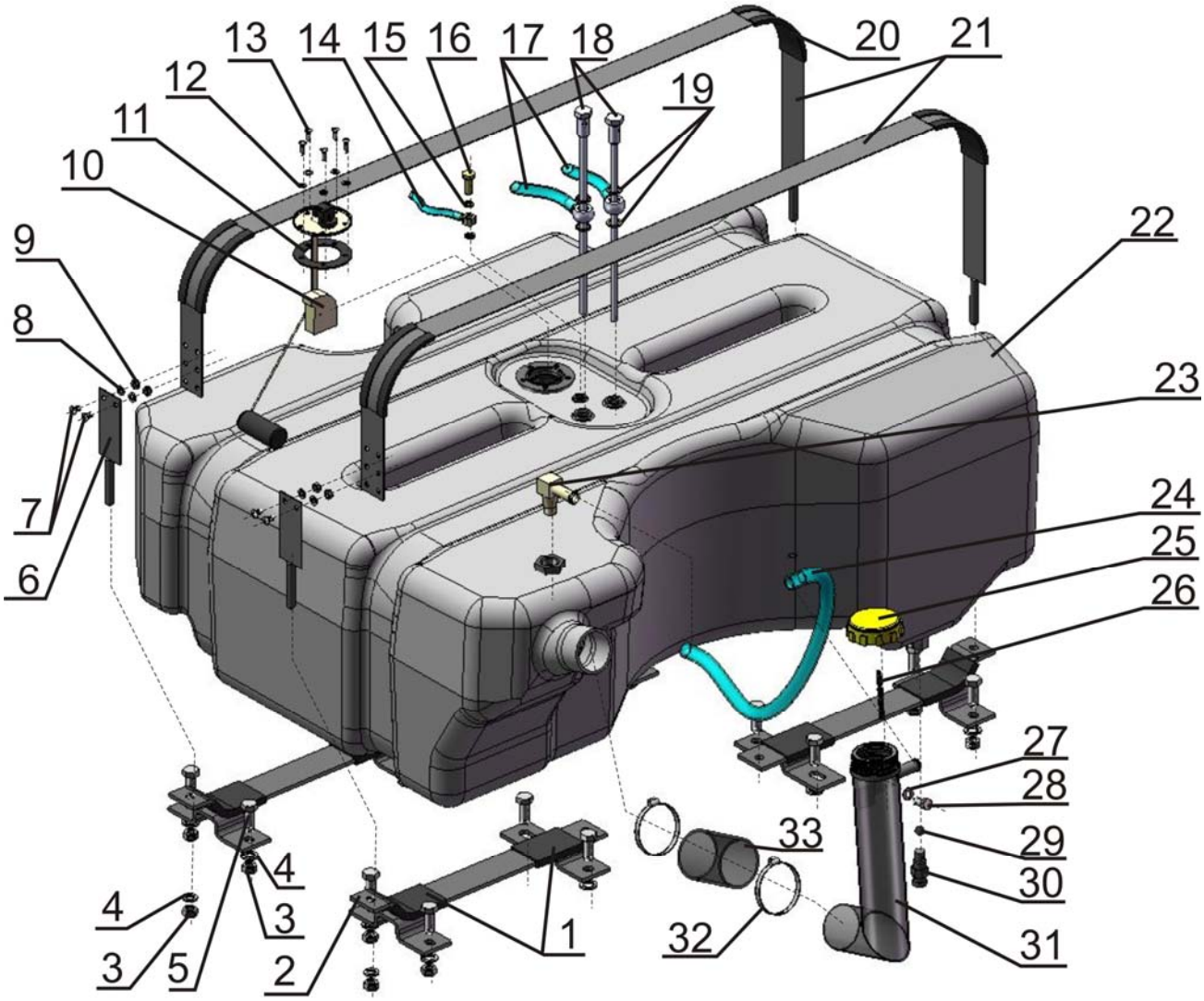
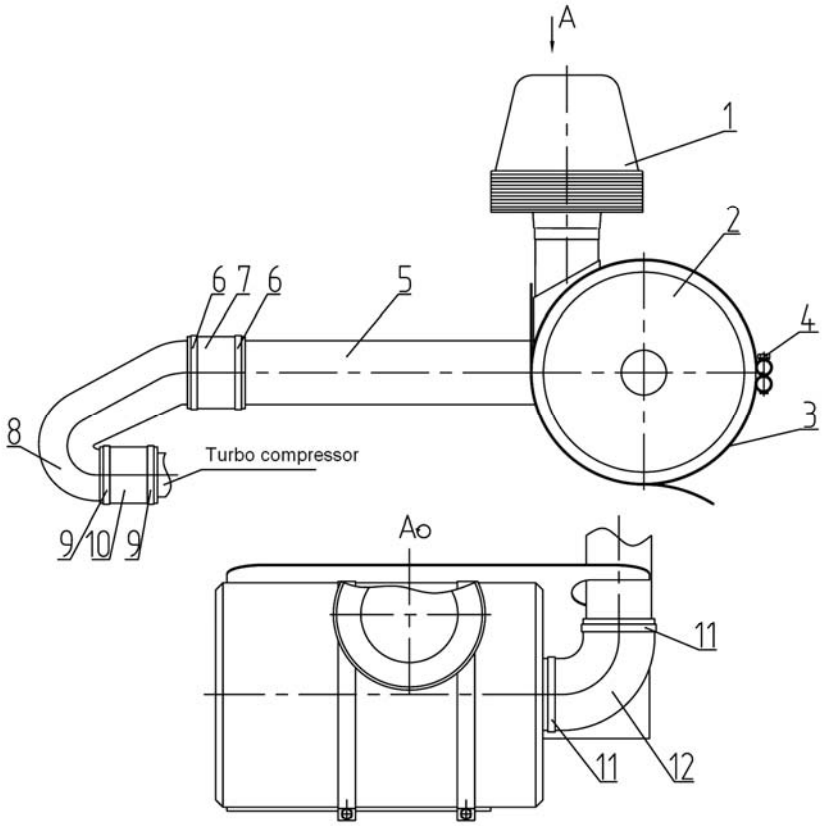



**Figure 3.16** Fuel tank

### 3.9 Disassembly-assembly of air purifier unit mounted on tractors BELARUS-1221.2/1221B.2/1221.3/1221.4 (MMZ)

a) dismount facia, as described in in section **8.3** “Dismounting-mounting facia of tractors BELARUS-1221.3/1221.4”;
b) loosen collars 6 and 9 (Figure 3.17);
c) dismantle branch pipes 7, 10 and air conduit 8;
d) loosen collars 11;
e) dismantle branch pipe 12 and air conduit 5;
f) unscrew bolts 4;
g) loosen fastening collars 3;
h) dismantle monocyclone 1;
i) dismantle air filter 2;
j) dismantle fastening collar 3.

Make assembly of air purifier in reverse sequence.



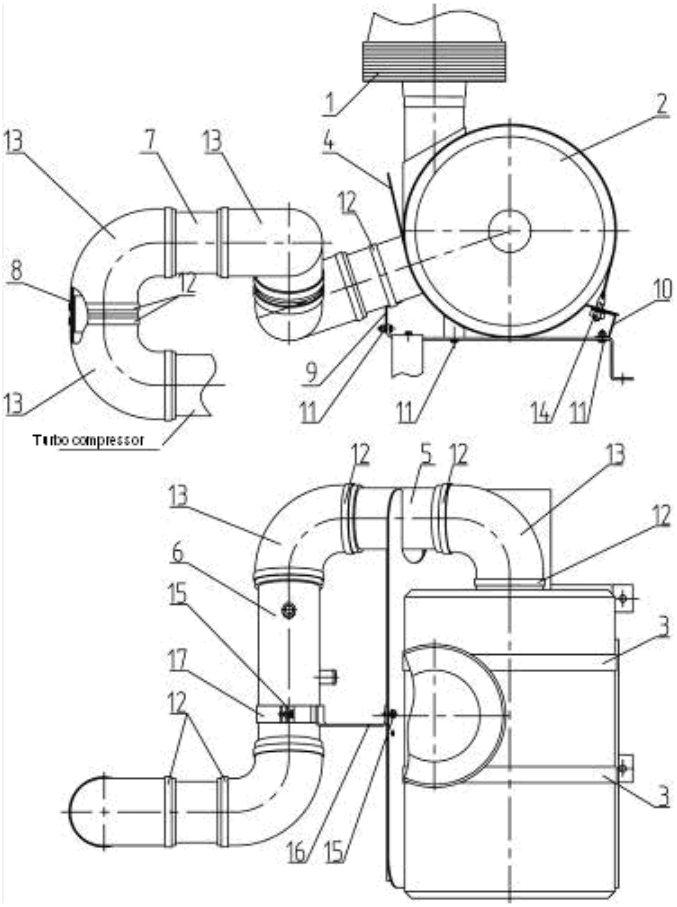

1- monocyclone; 2 – air filter; 3 – fastening collar; 4 - bolt; 5, 8 – air conduits;
6, 9, 11 – branch pipes; 7, 10, 12 – branch pipes.

**Figure 3.17** Mounting air purifier

### 3.10 Disassembly-assembly of air purifier unit mounted on tractors BELARUS-1221.4 Deutz

a) dismount facia, as described in in section **8.3** “Dismounting-mounting of facia of tractors BELARUS-1221.3/1221.4”;
b) unscrew bolts 15 (Figure 3.18);
c) dismantle arms 16, 17;
d) loosen collars 12;
e) dismantle branch pipes 13 and air conduits 5, 6, 7, 8;
f) unscrew nuts 14;
g) dismantle fastening collar 3, monocycle 1 and air filter 2;
h) unscrew bolts 11;
i) dismantle arms 4, 9, 10;

Make assembly of air purifier in reverse sequence.



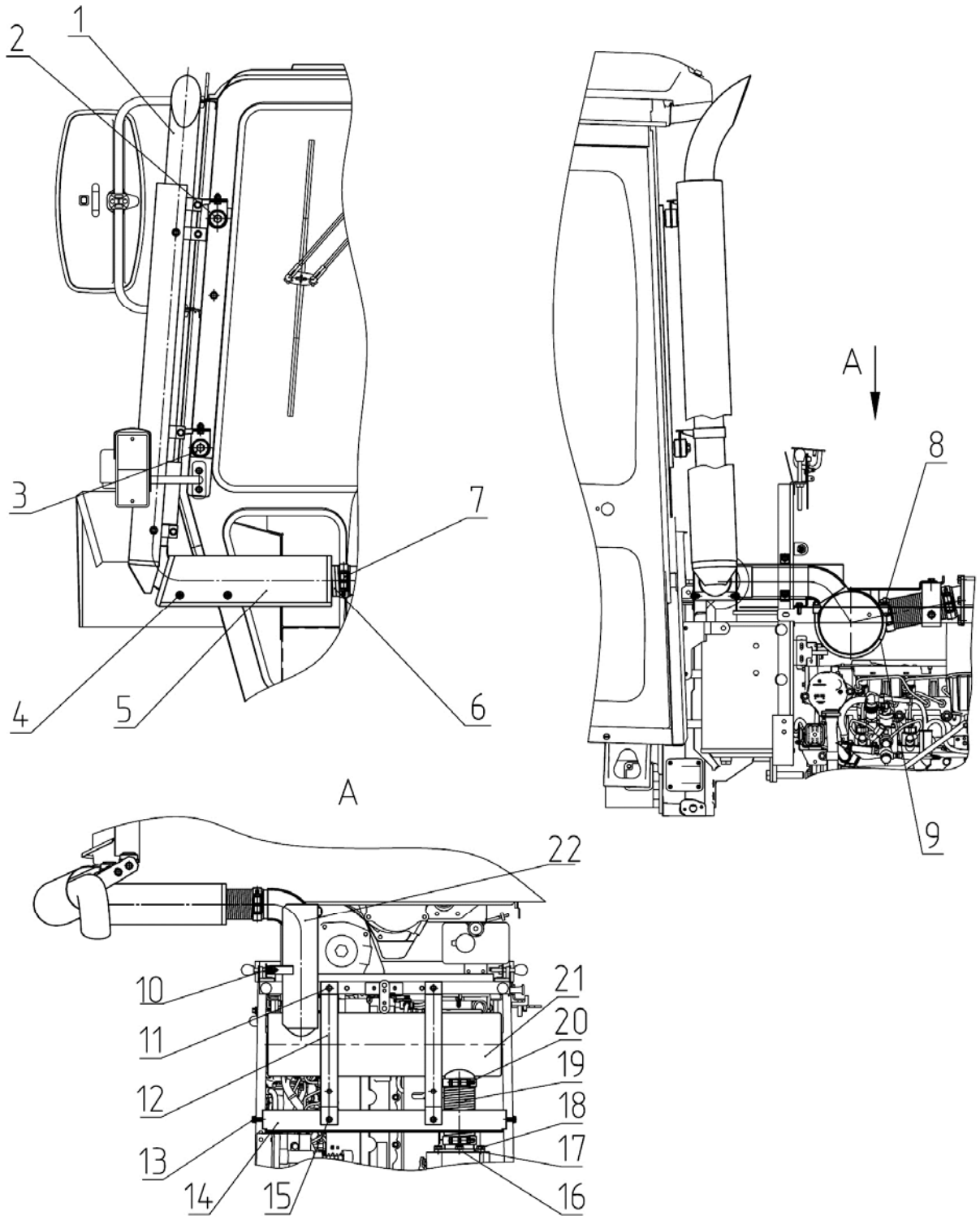

1- monocyclone; 2 – air filter; 3 – fastening collar; 4, 9, 10, 16, 17 - arms;
5, 6, 7, 8 – air conduits; 11, 15 – bolts, 12 – collars; 13 – branch pipes; 14 - nuts.

**Figure 3.18** Mounting air purifier

### 3.11 Disassembly-assembly of exhaust system of tractors BELARUS-1221.4

a) unscrew bolts 4 (Figure 3.19);
b) dismantle guarding 5;
c) loosening fastening of collars 7;
d) dismantle metal sleeve 6;
e) loosening fastening of collars 20;
f) dismantle metal sleeve 19;
g) unscrew bolts 2 of dampers 3;
h) dismantle outlet pipe 1 as an assembly;
i) unscrew bolt 10;
j) dismantle screen 22;
k) unscrew nuts 8;
l) dismantle braces 9 and muffler 21;
m) unscrew bolts 11 and 15;
n) dismantle supports 12;
o) unscrew bolts 13;
p) dismantle cross piece 14;
q) unscrew bolts 18;
r) dismantle branch pipe 17 and spacer 16.

Make assembly in reverse sequence.




1 – outlet pipe; 2, 4, 10, 11, 13, 15, 18 – bolt; 3 – damper; 5 – guarding; 6 – metal sleeve; 7 – collar; 8 – nut; 9 – brace; 12 – support; 14 – cross piece; 16 – spacer; 17 – branch pipe; 19 – metal sleeve; 20 – collar; 21 – muffler; 22 – screen.

**Figure 3.19**

### 3.12 Disassembly-assembly of fuel supply control mounted on tractors BELARUS-1221B.2

a) dismantle manual control of fuel supply, and to do this dismantle cover of right side panel, see section **8.4** “Disassembly-assembly of facia panels of right side panel”;
b) dismantle tie-rods 20, 22, 23 (Figure 3.20), having disconnected cotter pins 19 and pins 18;
c) unscrew nuts 8;
d) dismantle bearing retainer 9, washer 10 and 11, friction washer 12, handle 13;
e) dismantle tie-rod 27, 28, 29, having disconnected cotter pins 19 and pins 18;
f) dismantle tie-rod 30, having disconnected cotter pin 4;
g) disconnect spring 26;
h) unscrew bolts 24;
i) dismantle pedal 25;
j) to dismount reversal pedal 31 do the following:
1) unscrew bolts 24;
2) dismantle tie-rod 33, having disconnected cotter pins 19 and pins 18;
3) disconnect spring 32;
4) loosen nuts 36 for fastening steel rope 37 to arms 35 and 38;
5) disconnect bosses of steel rope 34, having disconnected cotter pins 4;
6) dismantle steel rope 37;
7) unscrew bolts 24;
8) dismantle pedal 31;
k) to dismount steel rope of engine shut-down 14 do the following:
1) disconnect fixing elements 2 with screw 1;
2) loosen nuts 5 that fasten steel rope 14 to arm 7;
3) dismantle nut 15 and dismount shut-down steel rope 14.

Make assembly in reverse sequence.
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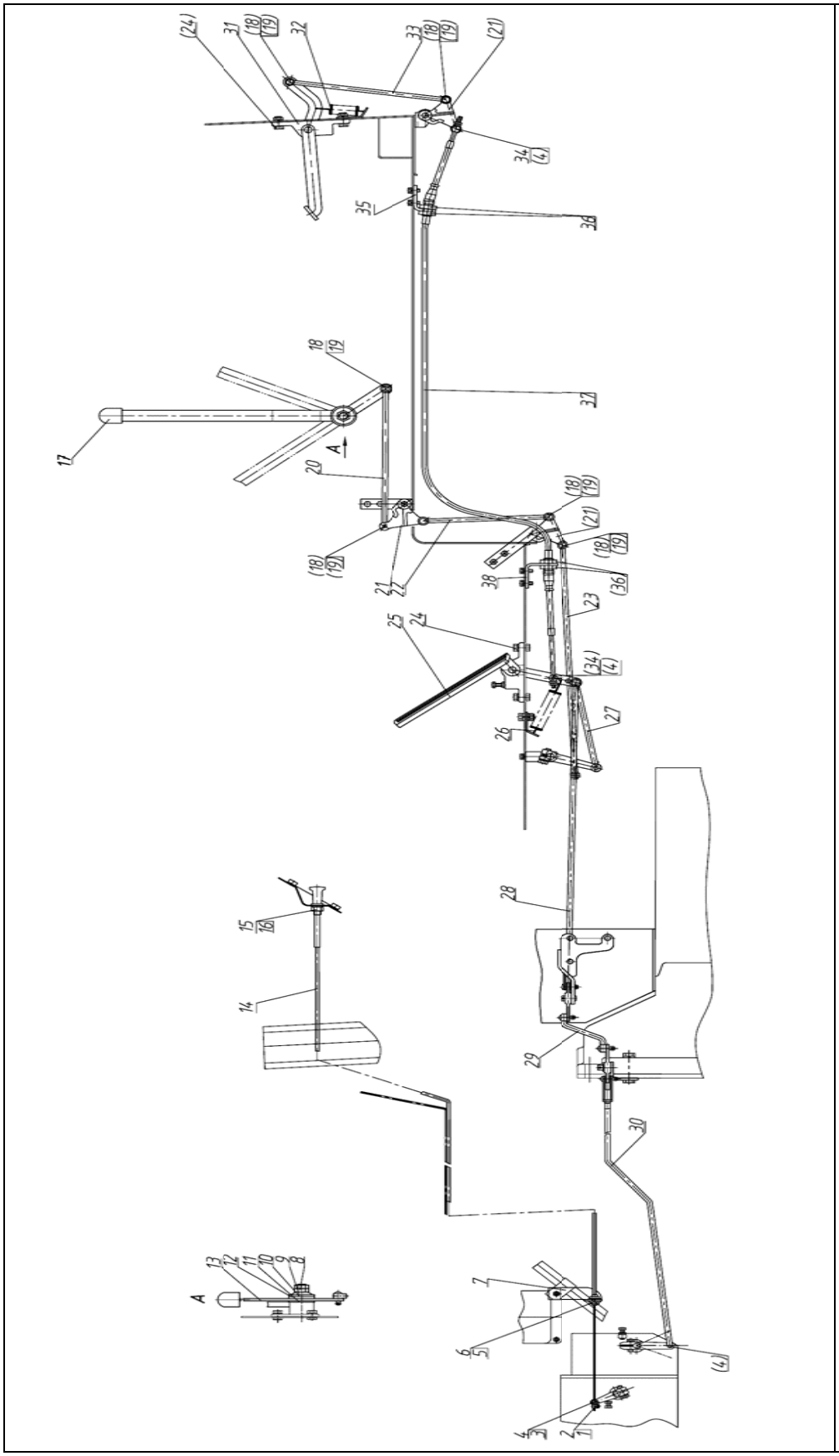


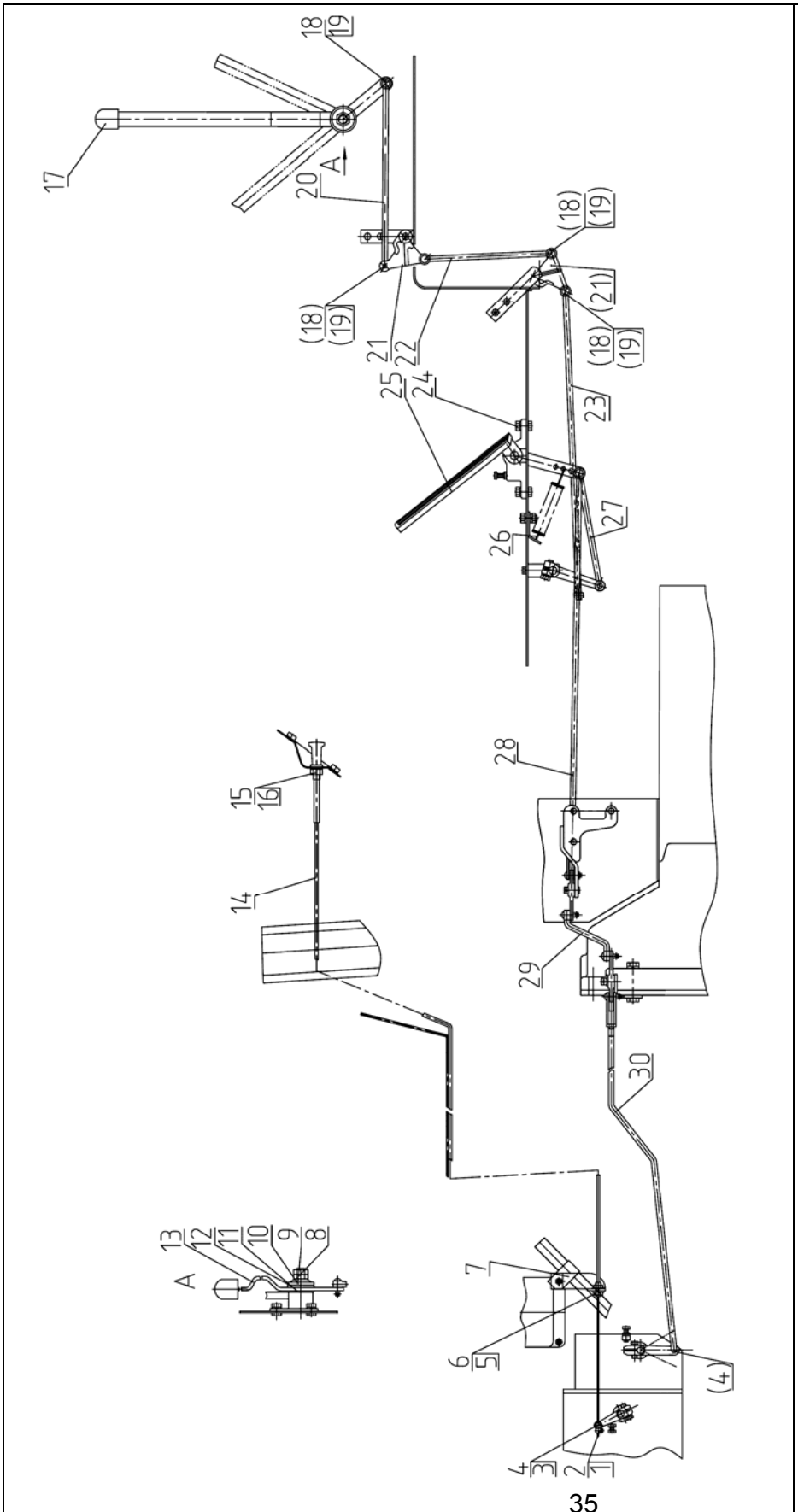
– screw; 2 – fixing element; 3 – boss; 4 – cotter pin; 5 – nut; 6 – washer; 7 –arm; 8 – nut; 9 – bearing retainer; 10 – washer; 11 – washer; 12 – friction washer ; 13 – handle; 14 – steel rope; 15 – nut; 16 – washer; 17 – handle; 18 – pin; 19 – cotter pin; 20 – tie-rod; 21 – lever; 22 – tie-rod; 23 – tie-rod; 24 – bolt; 25 – pedal; 26 – spring; 27 – tie-rod; 28 – tie-rod; 29 – tie-rod; 30 – tie-rod; 31 – pedal; 32 – spring; 33 – tie-rod; 34 – boss; 35 – arm; 36 – nut; 37 – steel rope; 38 – arm.

**Figure 3.20** Fuel supply control BELARUS-1221B.2

### 3.13 Disassembly-assembly of fuel supply control, mounted on tractors BELARUS-1221.2/1221.3

a) Dismount cover of right side panel, see section **8.4** “Disassembly-assembly of facia panels of right side panel”;
b) dismantle tie-rods 20, 22, 23, (Figure 3.21) having disconnected cotter pins 19 and pins 18;
c) unscrew nuts 8;
d) dismantle bearing retainer 9, washers 10 and 11, friction washer 12, handle 13;
e) dismantle tie-rods 27, 28, 29, having disconnected cotter pins 19 and pins 18;
f) dismantle tie-rod 30, having disconnected cotter pin 4;
g) disconnect spring 26;
h) unscrew bolts 24;
i) dismantle pedal 25;
j) dismantle steel rope of engine shut-down 14, and to do this:
1) disconnect fixing element 2 with screw 1;
2) loosen nuts 5 for fastening steel rope 14 to arm 7;
3) unscrew nut 15 and dismantle steel rope of engine shut-down 14.

Make assembly in reverse sequence.



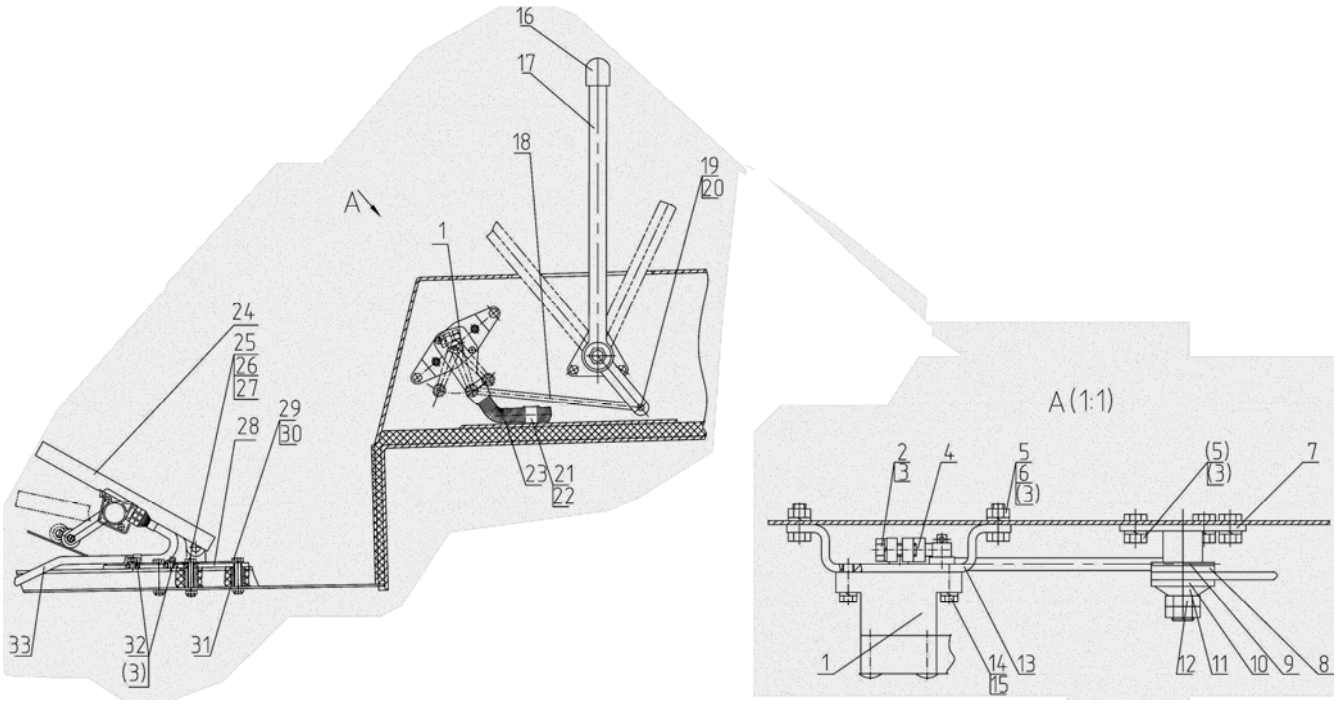

1 – screw; 2 – fixing element; 3 – boss; 4 – cotter pin; 5 – nut; 6 – washer; 7 – arm; 8 – nut; 9 – bearing retainer ; 10 – washer; 11 – washer; 12 – friction washer ; 13 – handle; 14 – steel rope; 15 – nut; 16 – washer; 17 – handle; 18 – pin; 19 – cotter pin; 20 – tie rod; 21 – lever; 22 – tie-rod; 23 – tie-rod; 24 – bolt; 25 – pedal; 26 – spring; 27 – tie-rod; 28 – tie-rod; 29 – tie-rod; 30 – tie-rod.

**Figure 3.21** Fuel supply control BELARUS-1221.2/1221.3.

**3.14 Disassembly-assembly of fuel supply control, mounted on tractors BELARUS-1221.4 with engines MMZ и Deutz**

a) disconnect harness 33 (Figure 3.22);
b) unscrew bolts 25, 29 and 32;
c) dismantle pedal 24 and plate 28;
d) dismantle cover of right side panel, see section **8.4** “Disassembly-assembly of facia panels of right side panel”;
e) dismantle cotter pins 19 and pins 20;
f) disconnect tie-rod 18;
g) unscrew nuts 12;
h) dismantle bearing retainer 11, washers 9, 10, friction washer 8, handles 16 and 17;
i) disconnect tie-rod 23;
j) unscrew bolts 5;
k) disconnect arm 13 as an assembly with sensor 1 and lever 4;
l) unscrew bolt 2;
m) disconnect leverr 4;
n) unscrew bolts 14;
o) disconnect sensor 1.

Make assembly in reverse sequence.




1 – sensor of manual control; 2, 5, 14, 25, 29, 32 – bolts; 3, 15, 26 – washers; 4 – lever; 6, 12, 27 – nuts; 7 – arm; 8 – friction washer; 9, 10 – washers; 11 – bearing retainer; 13 – arm; 16, 17 – handles; 18 – tie-rod; 19 – pin; 20 – cotter pin; 21 – busing; 22 – collar; 23, 33 – harness; 24 – pedal; 28 – plate; 31 - bushings.

**Figure 3.22** Fuel supply control BELARUS-1221.4 (MMZ, Deutz)

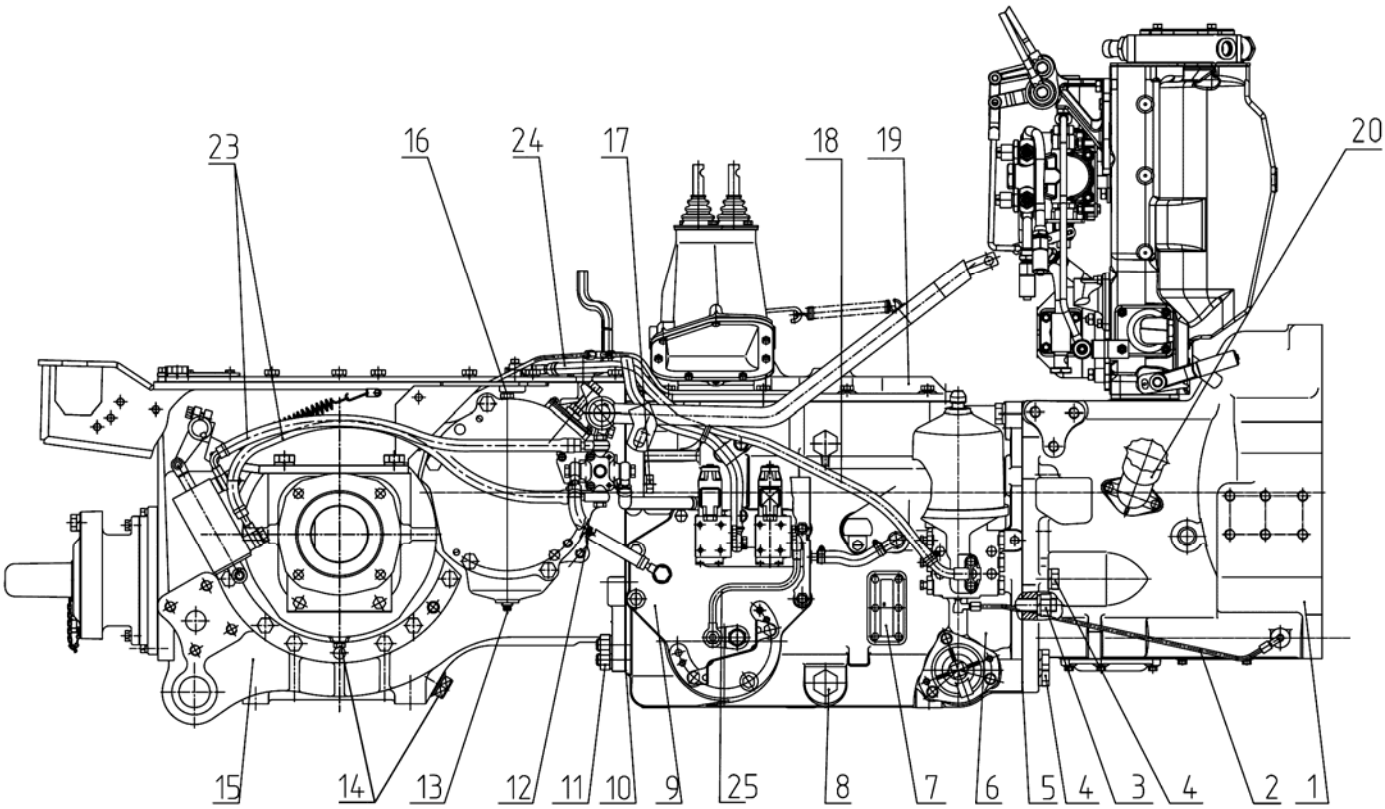
## 4 TRANSMISSION

Transmission is designed for transfer and conversion of torque from engine to rear drive wheels, drive of front driving axle and rear PTO shank, as well as for driving pump of hydraulic hinge system.

Bodies of main transmission units (body of clutch, gear box, and rear axle) also serve as part of tractor bearing skeleton.

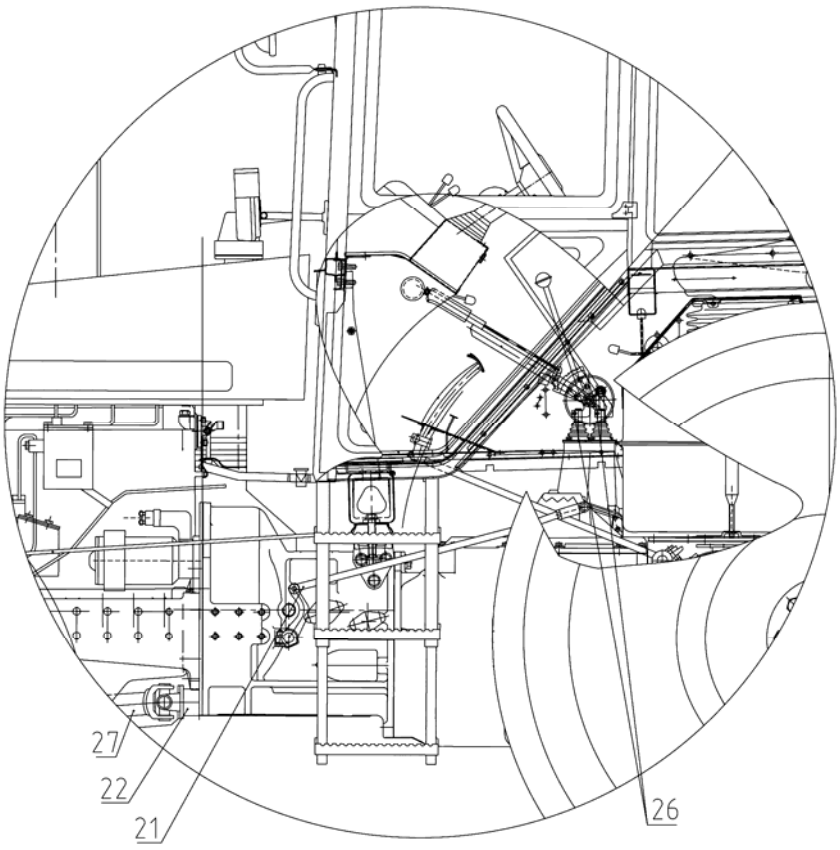
Transmission consists of: clutch body (1) (Figure 4.1**)**, gear shifting box (GSB) (6), rear axle (RA) (15) and other transmission units and parts installed on them. Butts between bodies are sealed with spacers (5) and (10) placed on sealant.

Oil is filled in transmission via fill-in neck (20) up to level of mark “F” on oil metering glass on the right-hand side of GSB (in travel direction), and in bodies of “wet” brakes via fill-in openings (16) to level of check openings (12) on wet brakes’ bodies. Oil is drained upon unscrewing draining plugs (8), (14) on body of GSB, RA and bodies of wet brakes (13).




1 – clutch body; 2 - pipeline; 3 – nut M20; 4 - bolts M20; 5 – spacer; 6 – gear box; 7 – oil metering glass; 8 – draining plug; 9 – FDA cover; 10 spacers; 11 – nuts M18; 12 – control plug of “wet” brakes; 13 – draining plug of “wet” brakes; 14 – draining plug;15 – rear axleт; 16 – fill-in plug of “wet” brakes”; 17 – bolts M18; 18 - pipeline; 19 – gear box cover; 20 – fill-in neck; 23, 24, 25 – pipelines;

**Figure 4.1** Transmission




21 – tie-rod of clutch; 22 – shaft of FDA drive; 26 – bolts for fastening GB levers; 27 – cardan shaft of FDA.

**Figure 4.2**

Technical data:
Torque for tightening bolts of butt between clutch coupling body and GSB body is 320…400 N·m; butt of GSB body – RA body is 250…320 N·m.
Operation fluid - oil М10Г$_2$ or М10В$_2$ State Standard GOST 8581-78.
Oil pressure at temperature 45…55°C:
- inside control system – 0.9…1.0 MPa;
- inside lubrication system – 0.1…0.2 MPa.

### 4.1 Transmission disassembly (general provisions)

a) drain oil from transmission, having unscrewed two draining plugs;
b) put transmission with engine on supports;
c) disconnect and dismantle pipelines of control system and transmission lubrication system passing through bodies' butts;
d) disconnect transmission from engine and dismantle tractor parts and units that hinder further disassembly;
To disconnect butts "clutch body – gear box" and "gear box – rear axle" unscrew fastening bolts and nuts of corresponding butt, and take units apart.

### 4.2 Unit-by-unit disassembly

#### 4.2.1 Disconnecting engine from transmission (tractor disconnection)

a) dismantle tractor facia;:
1) BELARUS-1221.2/1221B.2 see section **8.2** "Dismounting-mounting facia of tractor BELARUS-1221.2/1221B.2";
2) BELARUS-1221.3/1221.4 see section **8.3** "Dismounting-mounting facia of tractor BELARUS-1221.3/1221.4";
b) drain cooling fluid from tractor cooling system;
c) drain oil from HSC system, see section **7** "Steering";
d) release silicon branch pipes of supercharged air cooler, see section:
1) for tractor BELARUS-1221.3 - **3.2** "Dismounting supercharged air cooler (SAC), mounted on tractors BELARUS-1221.3";
2) for tractors BELARUS-1221.4 with engine MMZ - **3.3** "Dismounting supercharged air cooler (SAC, mounted on tractors BELARUS-1221.4 with engine MMZ";
3) for tracrors BELARUS-1221.4 with engine Deutz - **3.4** "Dismounting supercharged air cooler (SAC), mounted on tractors BELARUS-1221.4 with engine Deutz";
e) Dismantle engine harness:
1) for tractors BELARUS-1221.2/1221B.2, see section **11.1.1** "Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.2/1221B.2";
2) for tractors BELARUS-1221.3, see sections:
- **11.5.4** Operations performed when replacing engine;
- **11.6.1** Operations performed when replacing engine;
- **11.7.1** Operations performed when replacing engine;
3) for tractors BELARUS-1221.4 with engine MMZ, see section **11.10.1** "Operations performed when replacing engine";
4) for tractors BELARUS-1221.4 with engine Deutz, see sections:
- **11.8.1** "Operations performed when replacing engine";
- **11.9.1** "Operations performed when replacing engine";
f) disconnect condenser and drive of air conditioner compressor (if installed), see section **8.8** "Dismounting-mounting air conditioner (option) on tractors BELARUS-1221.3/1221.4";

g) dismantle HSC metal oil lines by having disconnected them from high-pressure sleeves:

1) for tractors BELARUS-1221.2/1221.3/1221.4 (MMZ) see section **7.1** “Disassembly-assembly of hydrostatic steering controlunits mounted on tractors BELARUS-1221.2/1221.3/1221.4 with engine MMZ”;

2) for tractors BELARUS-1221B.2, see section **7.1.2** “Disassembly-assembly of hydrostatic steering controlunits mounted on tractors BELARUS-1221B.2”;

h) for tractors BELARUS-1221.4 with engine Deutz: dismantle HSC oil lines 5, 8 (Figure 3.8) and disconnect from engine oil lines 10, by having disassembled brace 9, section **7.1.1** “Disassembly-assembly of hydrostatic steering control units mounted on tractors BELARUS-1221.4 with engine Deutz”;

i) disconnect oil lines from coarse fuel filter, see section **3.1** “Dismounting-mounting engines MMZ and Deutz”;

j) dismantle FDA cardan shaft;

k) connect lifting mechanism to engine, for slinging diagram see section **3.1** “Dismounting-mounting engines MMZ and Deutz”;

l) bring under clutch coupling body the threaded support P-7521-01 (or similar to it) (Figure 4.3);

m) to provide stable position of tractor front section put additional stationary support P-7523-01 under bearing frame;

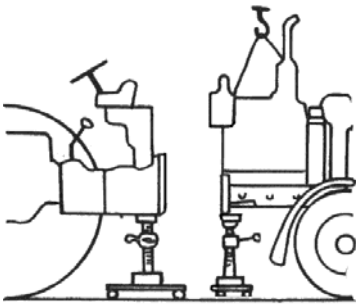


**Figure 4.3**

n) unscrew bolts for fastening diesel back sheet to clutch body, see section **3.1** “Dismounting-mounting engine MMZ and Deutz”;

o) using lifting mechanism, push engine forward until clutch coupling moves out of clutch body bell;

p) move away engine with front axle and side members from the disassembly site

### 4.2.2 Dismounting (disconnection) of clutch coupling body

a) disconnect engine from transmission, as described in section **4.2.1** “Disconnecting engine from transmission (tractor disengagement)”;

b) drain oil from transmission, having unscrewed draining plugs 8, 14 (Figure 4.1)

c) disconnect clutch tie-rod 21 from tap control lever (Figure 4.2);

d) disconnect FDA drive shaft 22 (Figure 4.2);

e) disconnect and dismantle pipelines 18, 23, 24, 25 of transmission hydraulic system (Figure 4.1);

f) disconnect oil line 2 for lubrication of the shell of FDA drive cardan shaft (Figure 4.1);

g) disconnect harness of FDA control, see section:

1) for tractors BELARUS-1221.3:

- **11.5.3** “Control of DI and FDA 1221-8700410 (electrical part), mounted on tractors BELARUS-1221.3”;
- **11.6** “Control of DI, FDA and front PTO 1221-8700210-Д (electrical part), mounted on tractors BELARUS-1221.3”;
- **11.7** “Control of DI, FDA, PTO and reduction gear 1221-8700250-Д (electrical part), mounted on tractors BELARUS-1221.3”;

2) for tractors BELARUS-1221.4:

- **11.8** “Control of DI and FDA, MMZ or Deutz, (electrical part), mounted on tractors BELARUS-1221.4”;

3) for tractors BELARUS-1221.4 Deutz:

- **11.9** “Control of engine Deutz 1221.4 – 8700910-Б, mounted on tractors BELARUS-1221.4”;

4) for tractors BELARUS-1221.4 MMZ:

- **11.10** Control of engine MMZ 1221.4 – 8700910-М, mounted on tractors BELARUS-1221.4;

h) disconnect connectors on transmission sensors, see section **11.4** “Dismounting-mounting elements of transmission electrical equipment”;

i) disconnect pipelines of brakes’ pneumatic drive, as described in sections:

1) **4.8** “Dismounting components of one-wire pneumatic drive on trailer brakes for tractors BELARUS-1221.2/1221.3”;

2) **4.9** “Dismounting components of two-wire pneumatic drive of trailer brakes”;

3) **4.10** “Dismounting components of combined pneumatic drive of trailer brakes of tractor BELARUS-1221.4 with engine Deutz”;

4) **4.11** “Dismounting components of one-wire pneumatic drive of trailer brakes for tractor BELARUS-1221.4 with engine MMZ”;

5) **4.12** “Dismounting components of two-wire pneumatic drive of trailer brakes”;

j) dismount cabin, see section **8.1** “Dismounting and mounting of cabin”;

k) shift lever for control of gear box (GB) oil pump to switched from position (Figure 4.4);

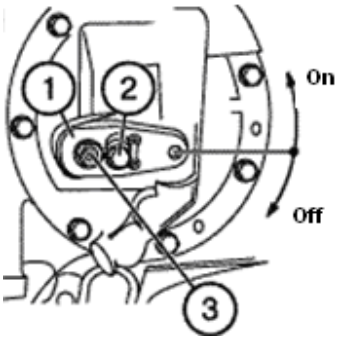



**Figure 4.4**

l) disconnect hoses of hydraulic hinge system (HHS) and distributor on oil tank, see section **9.1.1** “Disassembly-assembly of hydraulic system units”. Dismounting-mounting of distributor RP 70 1221; or Dismounting-mounting of distributor RS 213 Mita;

n) dismantle oil tank, see section **9.1.1** “Disassembly-assembly of hydraulic system units. Dismounting of oil tank from tractor with cabin dismantled (for hydraulic system with distributor RP 70-1221); or Dismounting of oil tank from tractor with cabin dismantled (for hydraulic system with distributor RS 213 Mita)”;

o) bring under gear box (GB) body screwed support P 7010-00 (or identical to it) (Figure 4.5) until it fully touches GB body;

p) put central support P-7118-00 on screwed support P 7010-00 and bring it under clutch coupling body until it fully touches body surface, (Figure 4.5);

q) unscrew nine bolts (M20) 4 and nut 3, see (Figure 4.1), for fastening body of CC to GB, and take aside CC body using screwed support P 7010-00 (Figure 4.5) or move it by means of lifting mechanism.

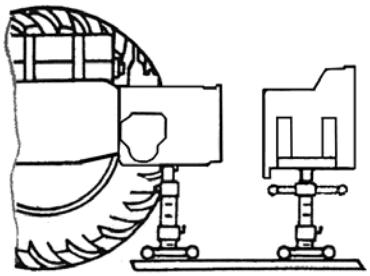


**Figure 4.5**

### 4.2.3 Dismounting (disconnection) of gear box body

a) disconnect engine from transmission, as described in section **4.2.1** “Disconnecting engine from transmission (tractor undocking)’;

b) disconnect clutch coupling body, as described in section **4.2.2** “Dismounting (disconnection) clutch coupling body”;

c) dismantle oil tank, as described in section **3.8** “Disassembly-assembly of fuel tank 1221-1101500, mounted on tractors BELARUS-1221.2/1221B.2/1221.3/1221.4 with engines MMZ and Deutz, with two cylinders of hinge device (hydraulic lift of hydraulic system)”;

d) dismantle pipeline for lubrication of rear axle differential 24 (Figure 4.1);

e) bring under rear axle body (RA) screwed support P 7010-00 (or identical to it) (Figure 4.6) until it fully touches the RA body;

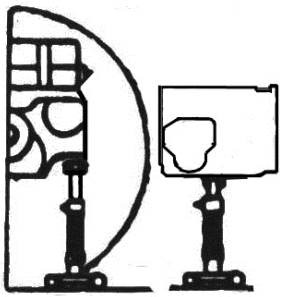


**Figure 4.6**

f) bring under gear box (GB) body screwed support P 7010-00 (or identical to it) (Figure 4.6) until it fully touches GB body;

g) to disconnect butt “GB body – RA body” remove GB cover 19 (Figure 4.1) and cover of FDA 9 to get access to bolts to be unscrewed, then unscrew ten bolts (M18) 17 and two nuts 11, and take the units apart.

### 4.2.4 Transmission assembly

Make assembly in sequence reverse to disassembly:

a) before assembly all parts must be clean, and worn out and damaged parts must be replaced for serviceable ones;

b) grease friction surfaces with mineral oil used for transmission lubrication;

c) during assembly bearings must be force fitted to the end by hammerless method, with effort transferred through the balls not allowed;

d) clean planes of bodies’ butts from spacers’ remains;

e) butting surfaces with thin layer of sealant according to specification TUU 6.10-00204234-004-95 or mastic ABRIS according to specification RuTu 5775-004-52471462-2003. Put one cardboard 1 mm thick spacer between CC and GB bodies. Put two cardboard 0.5 mm thick spacers between GB and RA bodies;

f) dock bodies by providing connection of slotted bushings and shafts, and seating in slots. Rotate shafts to make connection easier.

**Attention:** When docking transmission and engine, transmission shaft slots must fit slots of hubs of clutch driven disks. Do it by rotating engine crankshaft by flywheel rim. Do not tighten transmission with engine (for example, using elongated bolts) without making sure shaft slots fit hub slots to avoid damaging clutch driven disks.

g) main pair gears must have identical serial number. When connecting gear box with rear axle, move PTO clutch, torque of butt bolts tightening is from 250…300 N;

h) check and, if necessary, adjust side clearance of main pair: it must be 0.25…0.55 mm, with side clearance oscillations no more than 0.25 for one pair. Teeth overlap must be at least 50% of surface, with print location in the middle section of tooth or closer to cone summit. Make adjustment by interchanging number of spacers between flanges of right-side or left-side cups without changing total number of spacers;

i) torque when docking clutch coupling body is 400…500 N·m.

## 4.3 Clutch

### 4.3.1 Disassembly-assembly of clutch control units BELARUS-1221.2/1221.3/1221.4

a) unscrew bolt 4 (Figure 4.7), remove rod 2 and strap 1;
b) disconnect tie-rod 22, having pulled out pins 13;
c) unscrew yokes 24 and nuts 23 off tie-rod 22;
d) remove washer (20) and spring (21);
e) unscrew nut 19 and bolt 15;
f) remove arm (18), having unscrewed two bolts (16);
g) ) remove thrust (14) from pedal (6), having pulled out pin (13;
h) remove lever (25), having unscrewed bolt (11);
i) remove lever (10) from roller (9), having unscrewed bolts (7), (11);
j) remove pedal (6) from roller (9).

Make assembly and installation of clutch control parts and assemblies in sequence reverse to disassembly. During assembly grease pedal hub (6) with lubricant LITOL 24 according to State Standard GOST 21150-87.

Adjust clutch control.according to “Operating manual” for this tractor.

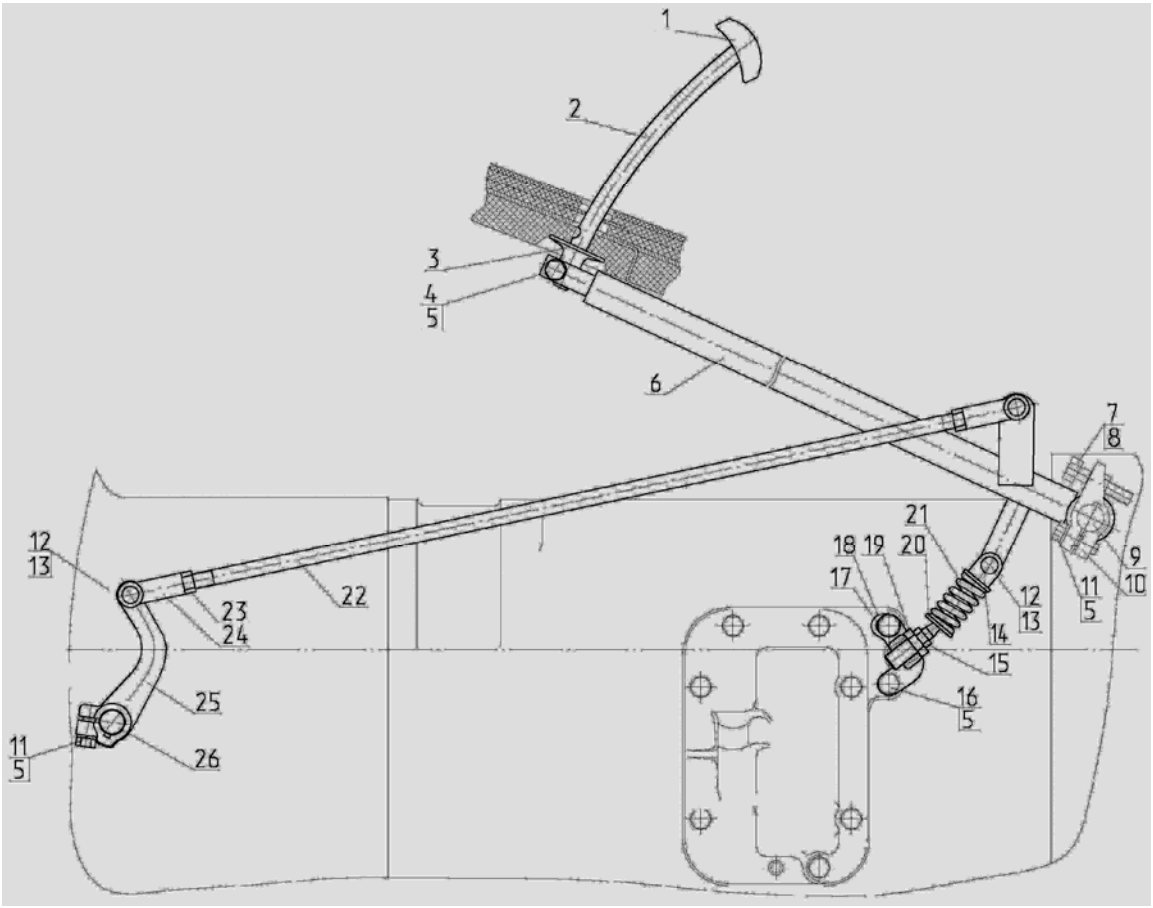



**Figure 4.7** Clutch control

### 4.3.1.1 Disassembly-assembly of clutch control units for BELARUS-1221B.2

Observe the following sequence of disassembly of clutch control units (Figure 4.8):

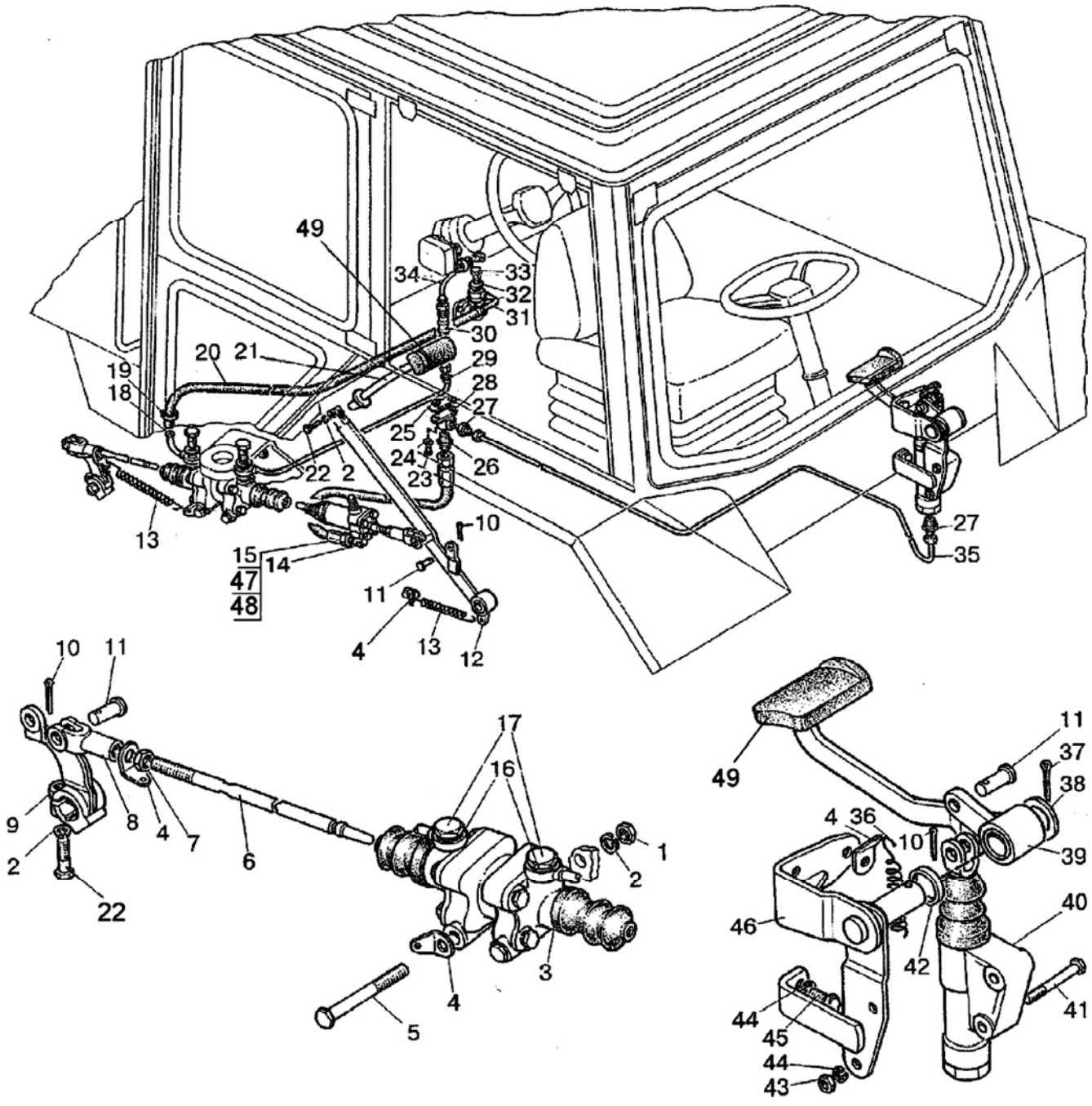



**Figure 4.8** Clutch control

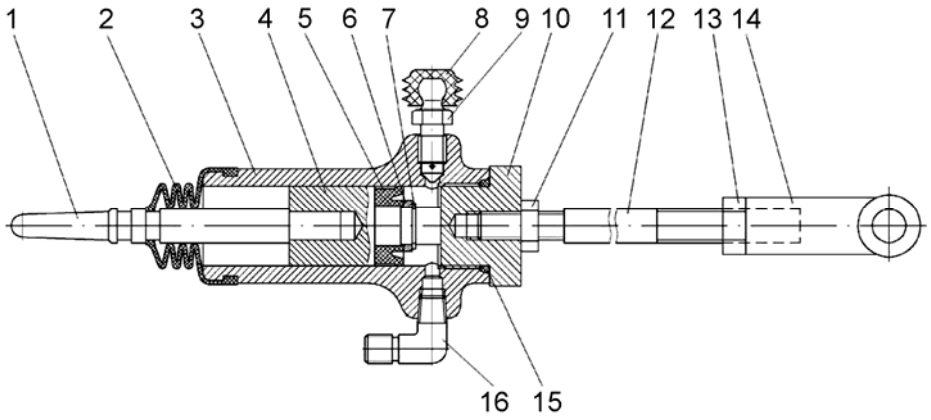



**Figure 4.9** Working cylinder

a) drain brake fluid from the system, and to do it:
1) remove protective cap 8 (Figure 4.9) from the working cylinder;
2) put on pipe connection 9 one end of hose and put another end in clean vessel;
3) unscrew pipe connection 9 by half turn:
3.1) keep pressing pedal 39 (Figure 4.8) until fluid is released from hydraulic system on reversal;
b) dismantle principal units of clutch control from tractor, and to do this:
1) disconnect pipeline 35, flexible sleeve 15 (Figure 4.8) by unscrewing cap nuts;
2) disconnect pusher of main culinder on reversal 40 from pedal 39 by pulling out pin 11;
2.1) remove main cylinder on reversal 40 from arm 46, having unscrewed two bolts 41;
2.2) remove spring 36, pedal 39;
2.3) remove arm 46, having unscrewed three bolts 45;
3) remove angle 28 from cabin, having unscrewed two bolts 23;
4) remove working cylinder 14 from pedal 12, having pulled out pin 11;
5) remove spring 13 from hydraulic booster 3 and tie-rod 6;
5.1) disconnect tie-rod 6, having pulled out pin 11;
5.2) disconnect pipelines 18, 29 from hydraulic booster 3, having unscrewed bolts 17;
5.3) unscrew two bolts 5, remove hydraulic booster 3 from the arm;
6) unscrew bolt 22, remove rod 21;
6.1) remove lever 9, having unscrewed bolt 22;
6.2) remove spring 13 from pedal 12;
6.3) remove pedal 12 from roller;
c) **disassembly main cylinder** for clutch control on reversal (Figure 4.10); to do this:
1) remove sheath 5 from body 1, pull pusher 3 out of cylinder, remove ring 2 from pusher 3;
2) unscrew plug 11, pull out spring 9, sealing ring 8, piston 7;
3) make assembly of main cylinder in sequence reverse to disassembly;
4) after assembly piston 7 must move smoothly and without jams, and return back to initial position after its travel to distance of 35 mm;
d) disassembly working cylinder (Figure 4.9), and to do this:
1) remove sheath 2 from body 3, extract piston 4;
2) remove lock ring 7 and sealing ring 5;

3) unscrew nut 11 and tie-rod 12;
4) unscrew cover 10, remove ring 15;
5) make assembly of working cylinder in sequence reverse to disassembly;

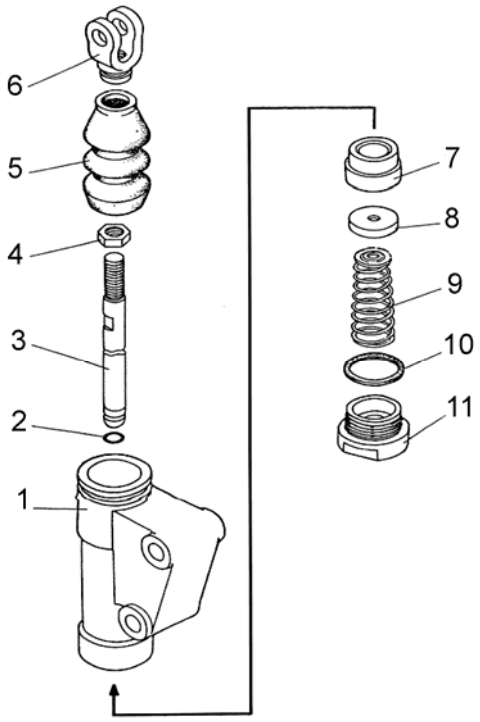



**Figure 4.10**. Main cylinder of clutch control on reversal

e) **disassembly hydraulic booster** (Figure 4.11); to do this;
1) remove covers 3, having unscrewed bolts 8, 10;
2) pull out piston 6, pusher 13;
3) remove locking ring 16, pull out spring 14, ball 7;
4) make assembly of hydraulic booster in sequence reverse to disassembly; grease friction surfaces with thin coat of motor oil under State Standard GOST 8581-78.

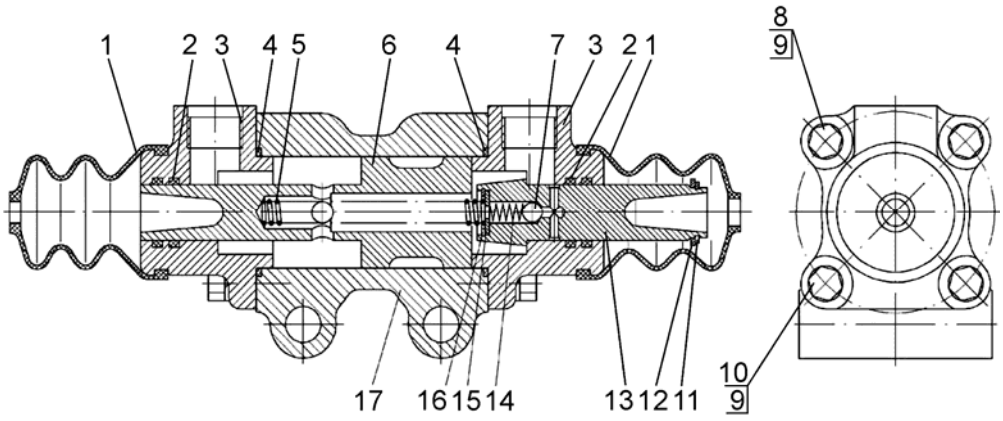


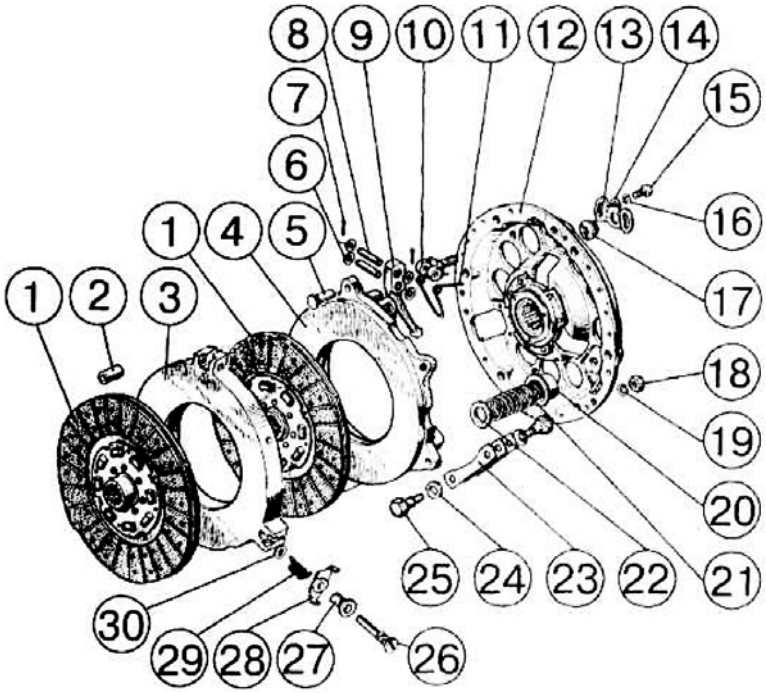

**Figure 4.11** Hydraulic booster

Make assembly and mounting of parts and assemblies of clutch control in sequence reverse to disassembly. Before assemblying main and working cylinders hydraulic boosters must be clean. Presence of foreign particles (dust, paint, chips, pile) is not allowed.

Before assembly of main cylinder and working cylinder on reversal grease friction surfaces with thin layer of braking fluid NEVA-M under Specification TU 2451-053-36732629-2003. Avoid ingress of mineral oil, benzene, kerosine and diesel fuel on parts, as these substances lead to swilling of rubber sealants.

Make adjusting and pumping of clutch control hydraulic system according to “Operating manual of BELARUS-1221B”

### 4.3.2 Disassembly-assembly of clutch coupling




1 – driven disk; 2 – bushing; 3 – middle disk; 4 – squeeze disk; 5 – thrust; 6, 14, 24 – washers; 7 – cotter pin; 8 – pin; 9 – squeeze lever; 10 – yoke; 11 – special spring; 12 – supporting disk; 13 – retaining plate; 15 – bolt; 16, 19 – spring washer; 17 – adjustment nut; 18 – nut; 20 – cup; 21 – squeeze spring; 22 – insulating washer; 23 – plate; 25 – special bolt; 26 – lever axle; 27 – metal ceramic bushing; 28 – divider lever; 29 – spring; 30 – retaining washer.

**Figure 4.12**

a) via technological openings of supporting disk 2 screw inside squeeze disk (Figure 4.13) three bolts 1 (Ml2x40) to squeeze springs;

b) unscrew six nuts 3 and remove supporting disk 2 together with squeeze disk;

c) dismantle six supporting bushings 4;

d) dismantle driven disk 5;

e) dismantle middle disk 6;

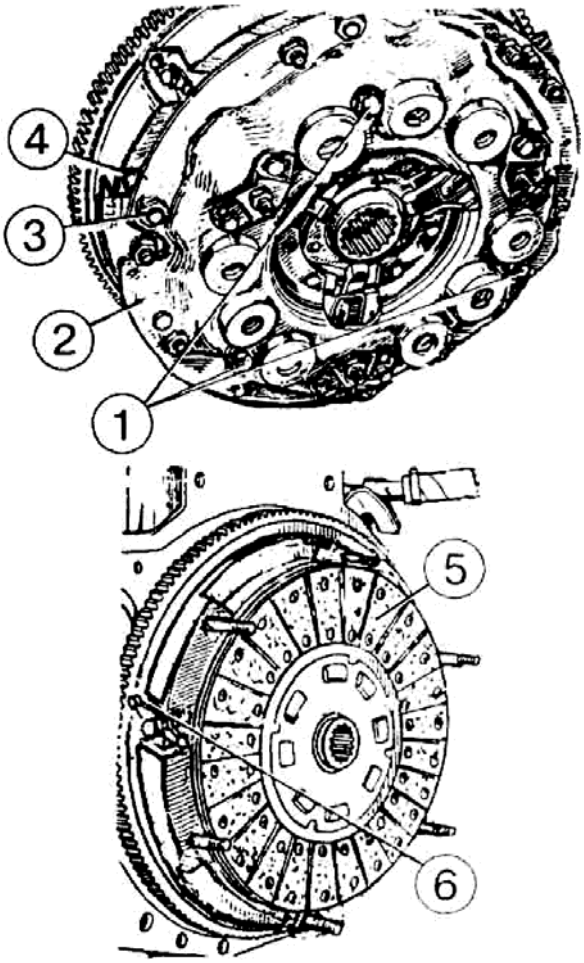



**Figure 4.13**

f) remove second driven disk 7 (Figure 4.14);

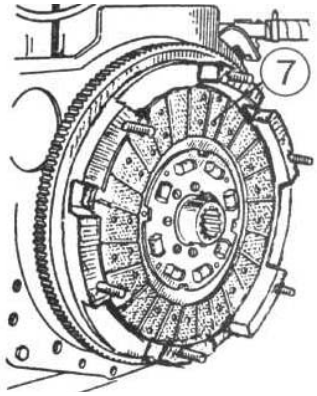



**Figure 4.14**

g) install squeezing device 1 on disks as an assembly (Figure 4.15);

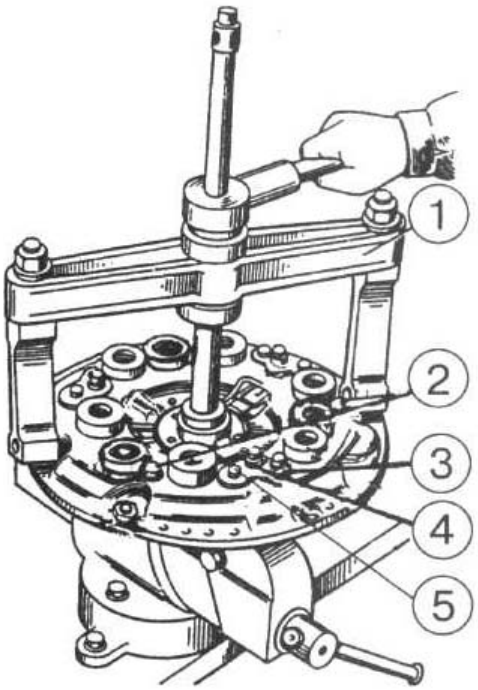



**Figure 4.15**

h) unscrew technological bolts 2 (Figure 4.15) (M12x40);
i) dismantle retaining plates 3 by unscrewing six bolts 5 and pull out adjustment nuts 4;
j) unscrew nut of squeezing device and dismount supporting disk;
l) unpin pin and dismount axles of squeeze levers and squeeze levers.

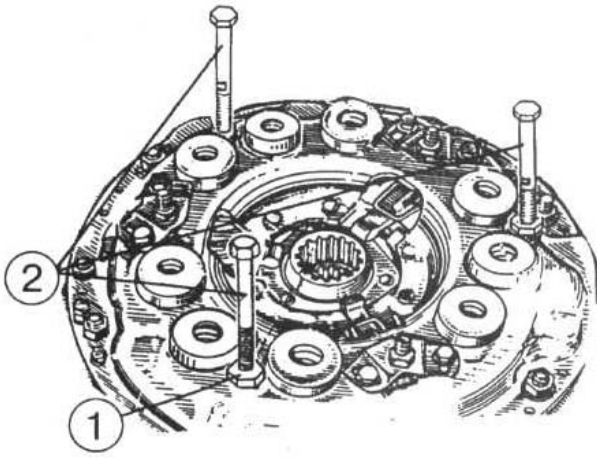



**Figure 4.16**

**ATTENTION!** Instead of device one can use three bolts Ml2x100. Before dismounting clutch from flywheel, bolts 2 (Figure 4.16) must be screwed in technological openings of disks in place of bolts Ml2x40. Having screwed nuts 1 of bolts 2 inside supporting disk to the end, provide contraction of squeeze springs by 1.5…2.0 mm.

### 4.3.3 Mounting disks of clutch coupling on engine flywheel

Perform mounting of clutch coupling disks on engine flywheel in the following order:
a) mount first driven disk with hub long end facing flywheel;
b) mount middle disk as an assembly inside flywheel along three grooves;
c) mount second driven disk with hub short end facing middle disk;
d) mount bushings on flywheel pins;
e) mount assembled set of disks on flywheel pins and fasten with six nuts.

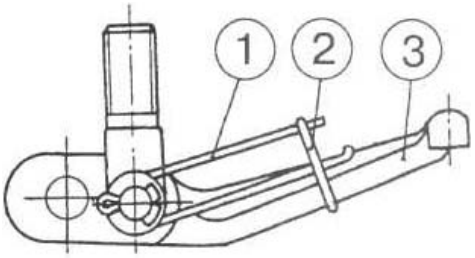



**Figure 4.17**

**ATTENTION!** For convenience of assemblying supporting disk with squeeze disk, fasten ends of spring 1 with grips 2 (Figure 4.17). Pass levers 3 in grooves of supporting disk after they are installed on squeeze disk. Contract supporting disk by means of special device and put technological bolts, or contract disks by means of elongated technological bolts.

### 4.3.4 Adjusting position of squeeze levers

a) insert rim 2 (Figure 4.19) inside slots of driven and supporting disks and in the inside diameter of flywheel bearing to align splines of disks with flywheel axle;

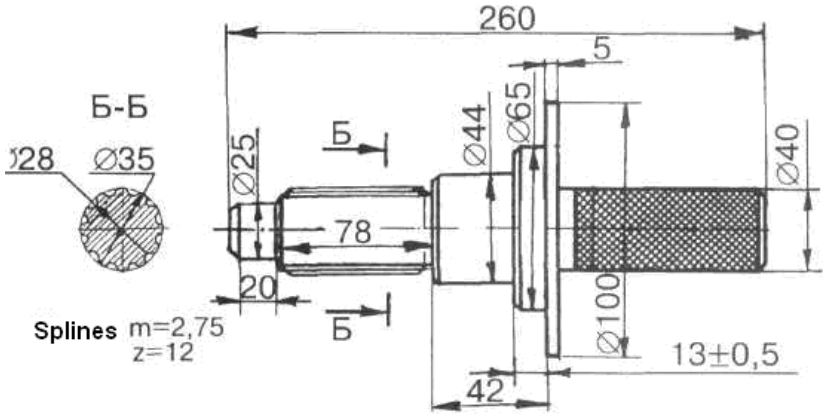



**Figure 4.18**

b) remove three technological bolts 3;

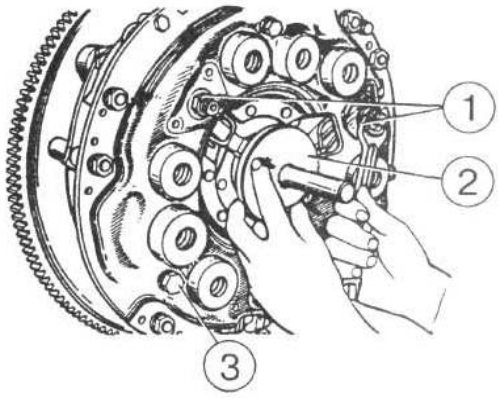



**Figure 4.19**

c) adjust position of squeeze levers by adjustment nuts 1, having set distance from supporting surfaces of levers to end face of supporting disk hub equal to 13.5…14.5 mm.

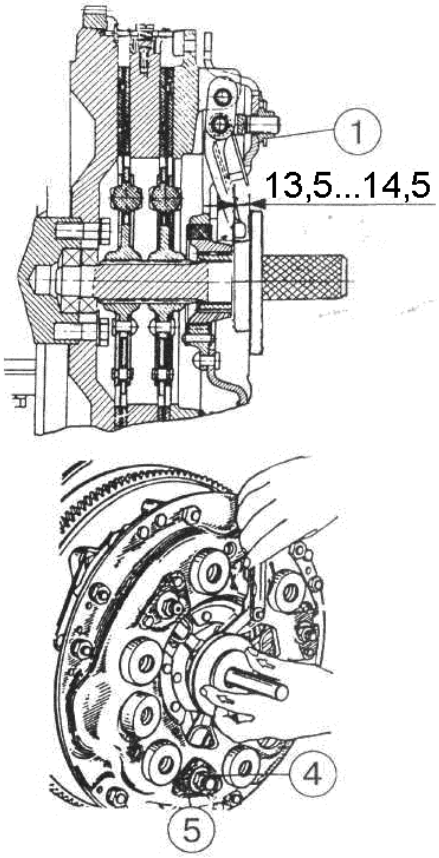
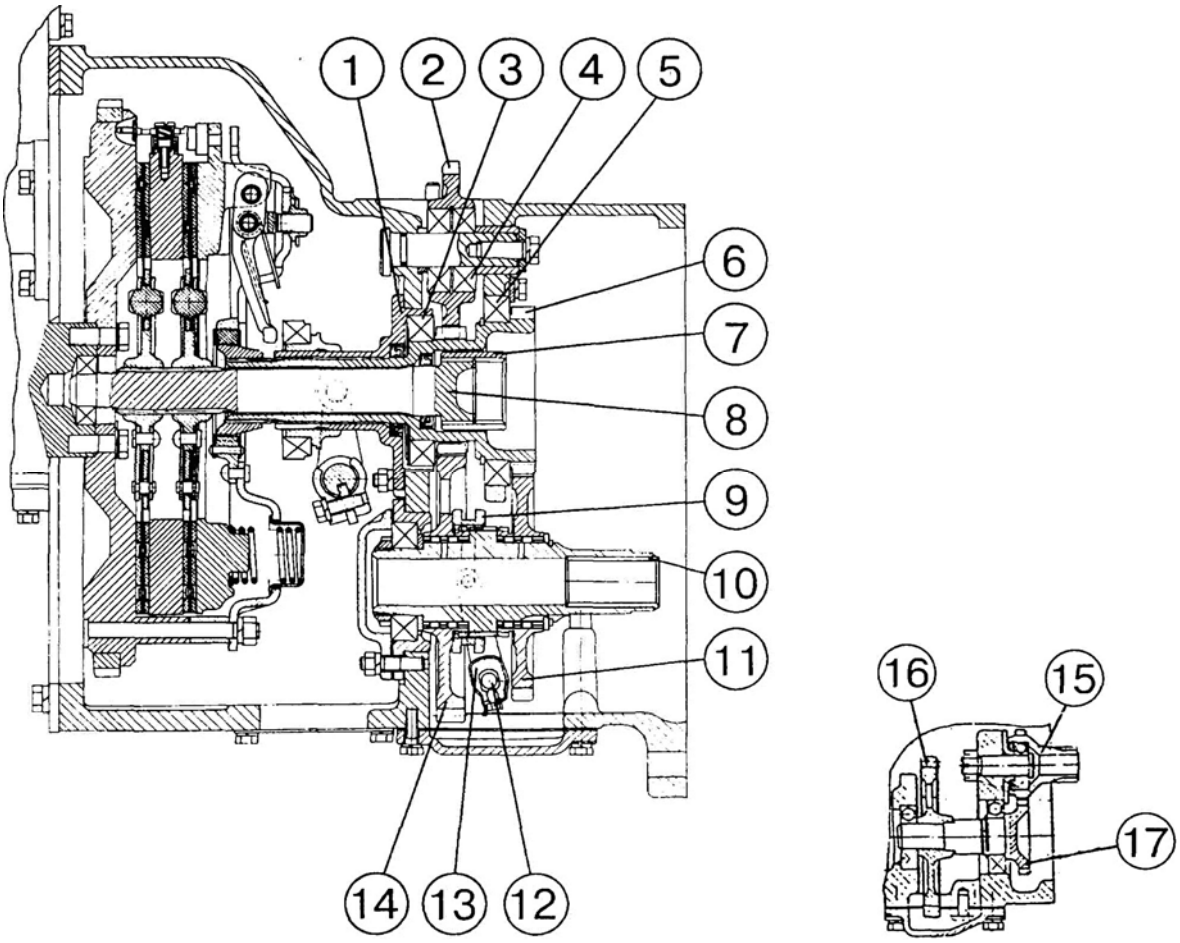



**Figure 4.20**

Variation of dimension for individual leverов must not exceed 0.3 mm.
After adjustment secure nuts 4 (Figure 4.20) against turning through by retaining plates 5.

**4.3.5 Reduction gear section of clutch coupling body**

Drive shaft 6 (Figure 4.21) of stand-alone PTO, mounted on two bearings 3 and 5, has two gear rings. Smaller gear ring is permanently engaged with gear 2 of pump drive for hydraulic hinge system, and gear 14 of the first stage of PTO reduction gear; another gear ring is permanently engaged with gear 11 of the second stage of PTO reduction gear and gear 16 for driving transmission hydraulic system pump. Gears 11 and 14 are installed on shaft 10 and connected to it by means of tooth clutch.




1 – arm; 2 – driving gear of hydraulic system pump; 3, 4, 5 – bearings; 6 – driving shaft; 7 – bushing; 8 – power shaft; 9 – tooth clutch; 10 – driven shaft of PTO drive; 11 – gear of stage II of PTO drive; 12 – roller; 13 – yoke; 14 - gear of stage I of PTO drive; 15, 16, 17 – driving gears of transmission hydraulic system.

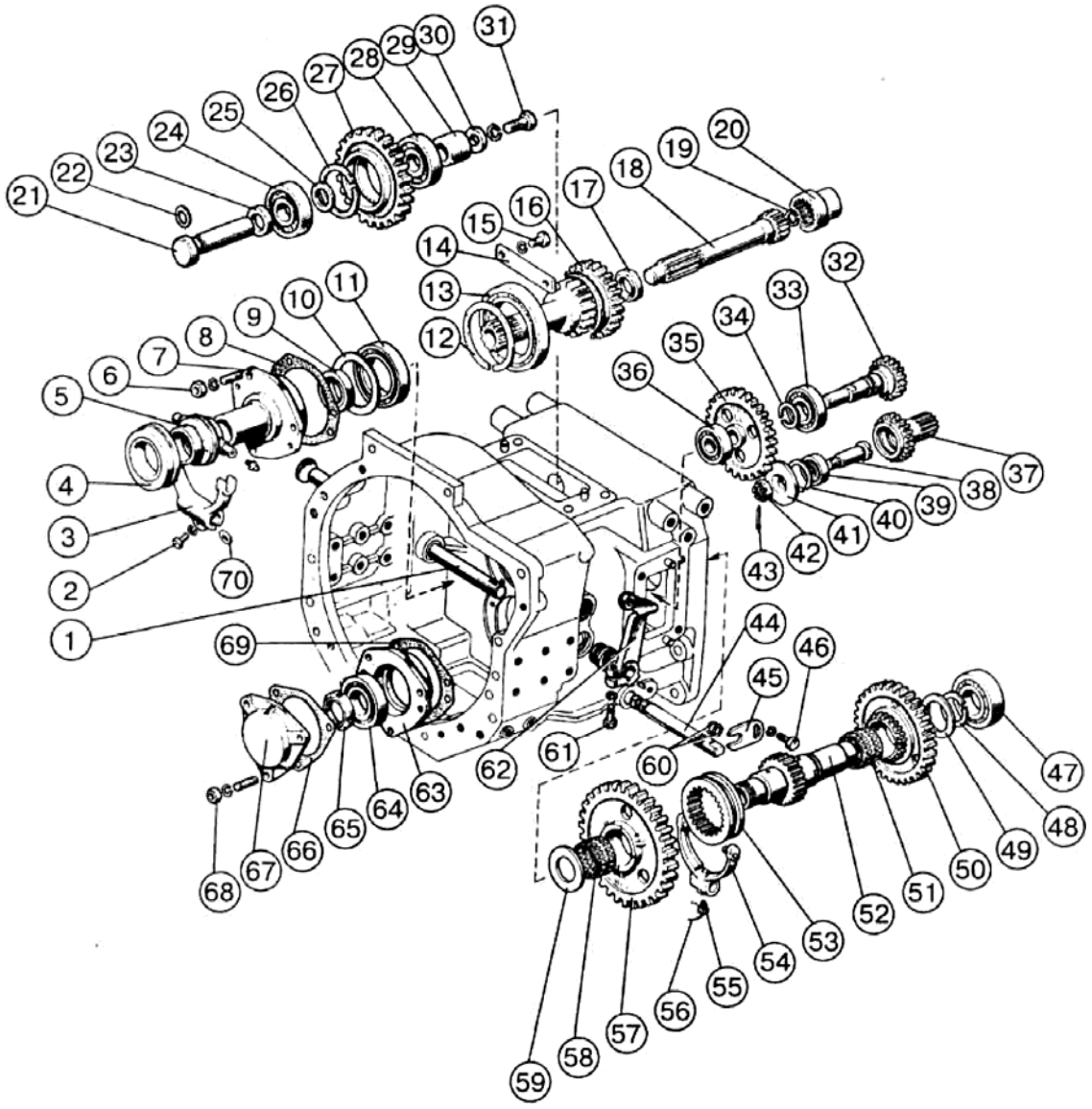
**Figure 4.21**

The pump of transmission hydraulic system is driven by drive shaft 6 (Figure 4.21) via gears 16 and 17 to gear of drive 15 actuation.

Stages I or II of PTO reduction gear are actuated by turning roller 12 with yoke 13, which puts tooth clutch 9 to position of interlock of gears 11 or 14.

Upon clutch couple engagement torque from clutch couple driven disks is transferred to primary shaft of gear box via shaft 8, bushing 7.

### 4.3.6 Disassembly of the reduction gear section of clutch coupling body




1 – shaft; 2 – bolt; 3 – yoke; 4 – bearing; 5 – tap; 6 – nut; 7 – arm; 8 – spacer; 9 – sealing ring; 10 – washer; 11 – bearing; 12 – ring; 13 – bearing; 14 – bar; 15 – bolt; 16 – shaft; 17 – sealing ring; 18 – power shaft; 19 – ring; 20 – bushing; 21 – axle; 22 – ring; 23 – washer; 24 – bearing; 25 – ring; 26 – ring; 27 – gear; 28 – bearing; 29 – bushing; 30 – washer; 31 – bolt; 32 – gear; 33 – bearing; 34 – ring; 35 – gear; 36 – bearing; 37 – gear; 38 – axle; 39 – bearing; 40 – ring; 41 – washer; 42 – nut; 43 – cotter pin; 44 – roller; 45 – plate; 46 – bolt; 47 – bearing; 48 – ring; 49 – washer; 50 – gear; 51 – bearing; 52 – driven shaft; 53 – PTO driving shaft; 54 – yoke; 55 – bolt; 56 – wire; 57 – gear; 58 – bearing; 59 – washer; 60 – ring; 61 - bolt; 62 – lever; 63 – cup; 64 – bearing; 65 – nut; 66 – spacer; 67 – cover; 68 – nut; 69 – spacer; 70 – boss.

**Figure 4.22**

a) first drain oil from clutch coupling body.
b) disconnect tractor skeleton in plane “diesel”- “clutch body” - «gear box
c) disconnect and remove meshed filler neck, side and bottom covers, covers’ spacers.

**To dismount lever of switching clutch coupling and tie-rod**, do the following:

a) unpin pin and pull out pin 2 (Figure 4.23), disconnect tie-rod 1.
b) unscrew bolt 4, remove lever 3.

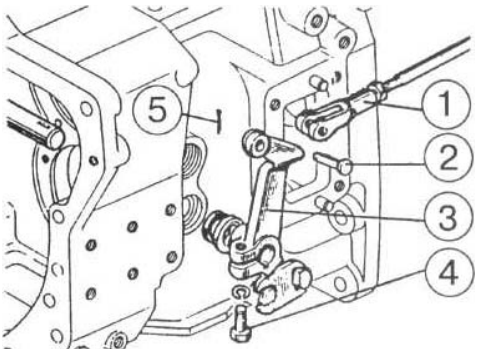



**Figure 4.23**

**To dismount tap, yoke and clutch coupling roller** do the following:

a) unscrew bolt 4 (Figure 4.24) for yoke fastening;
b) pull roller 2 out of clutch body, having first removed yoke 3 and boss 5 from it;
c) remove tap 1.

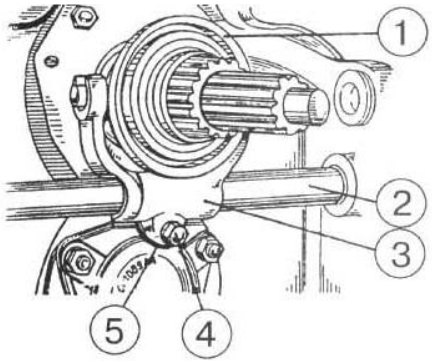



**Figure 4.24**

**To dismount shaft, driven PTO drive, yoke, roller, clutch for shifting modes**, do the following:

a) extract shaft 1 (Figure 4.25);
b) unscrew nuts 2 and remove cover 3;

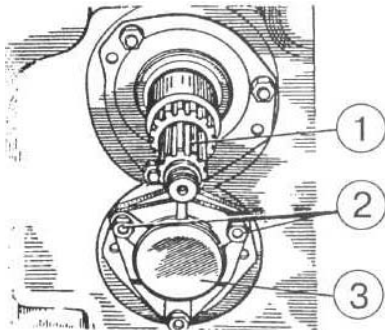



**Figure 4.25**

c) press bearing 1 from shaft (Figure 4.26);

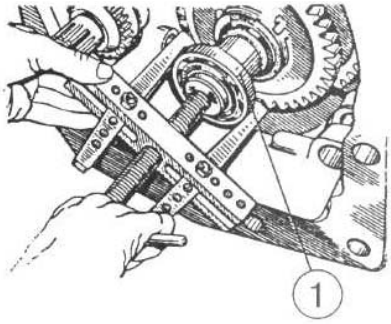



**Figure 4.26**

d) unscrew crown nut 1 (Figure 4.27) of PTO drive driven shaft;

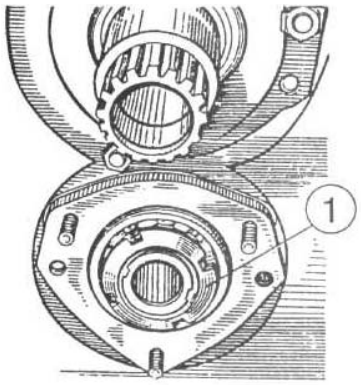



**Figure 4.27**

e) knock driven shaft 1 (Figure 4.28) of PTO drive outwards and extract it from clutch body together with gear of stage II;

f) screw two technological bolts inside threaded openings of cup 2, and using them press out cup 2 together with bearing;

g) press bearing out of cup;

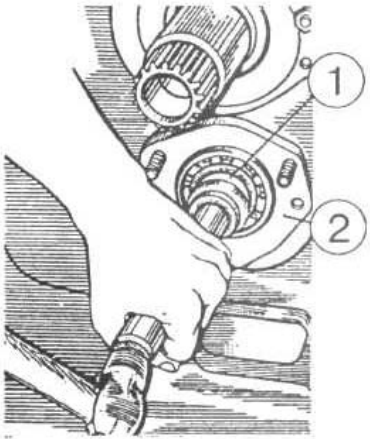



**Figure 4.28**

h) remove ring 1 (Figure 4.29) that locks gear 2 on shaft 4;
i) remove washer 3 and gear 2;

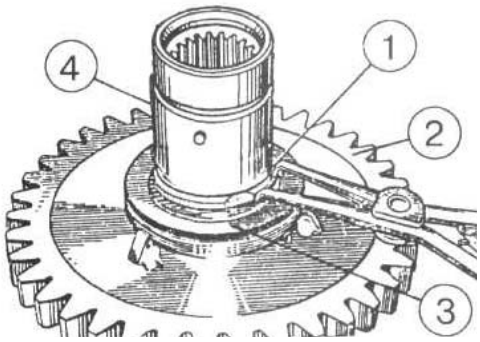



**Figure 4.29**

j) remove bearing 1 (Figure 4.30) from shaft 2;

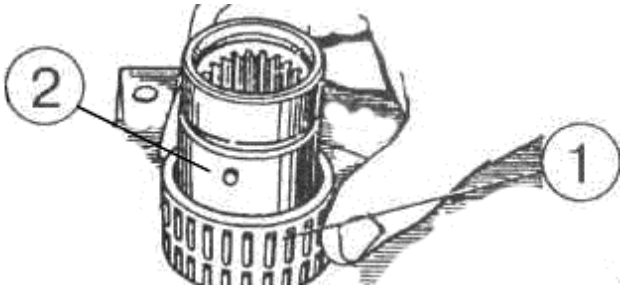



**Figure 4.30**

k) remove locking wire, unscrew bolt 3 (Figure 4.31) for fastening yoke 2;
l) remove clutch 1;

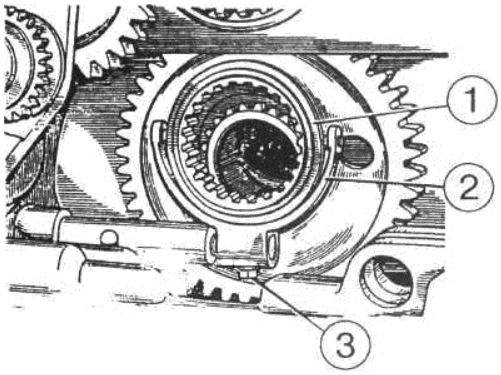



**Figure 4.31**

m) unscrew bolt 5 (Figure 4.32) and remove plate 6;
n) knock roller 4 inside clutch body;
o) extract yoke 2 (Figure 4.31) and gear 7 (Figure 4.33) of I stage of reduction gear.

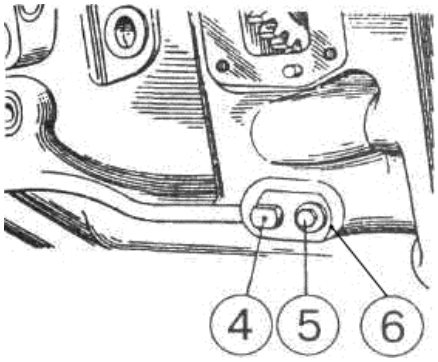



**Figure 4.32**

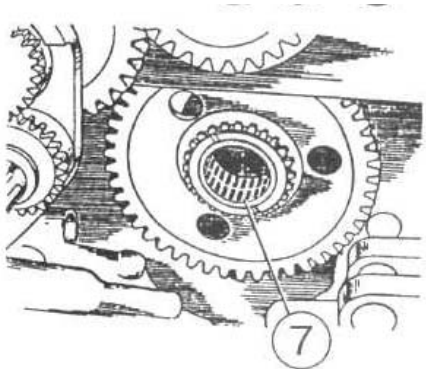



**Figure 4.33**

**To dismount pump driving gears of transmission hydraulic system** do the following:
a) unpin and unscrew nut 1 (Figure 4.34);

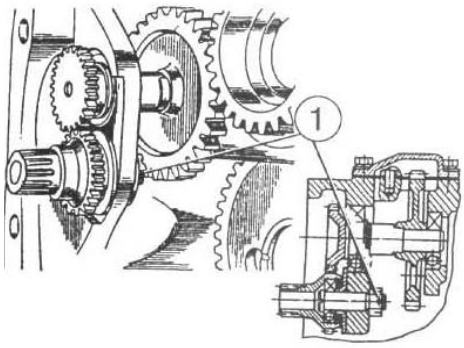



**Figure 4.34**

b) press out gear 1 (Figure 4.35) together with axle, bearingом and locking ring;
c) remove washer 2;

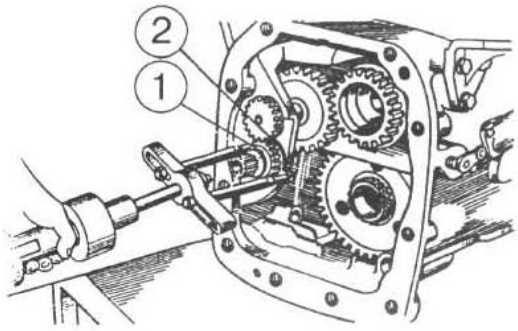
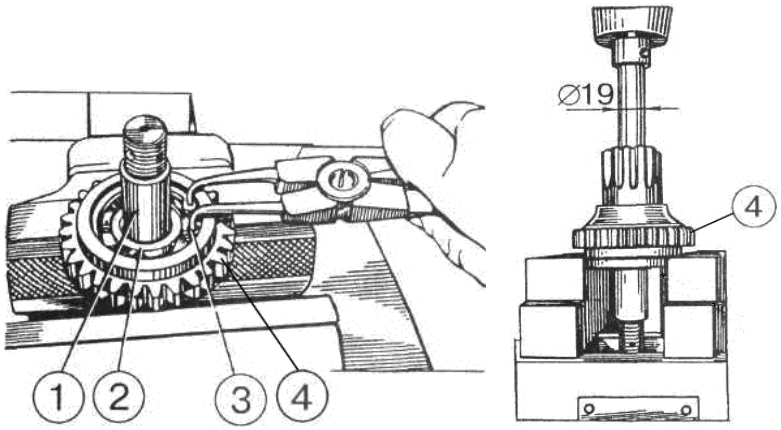



**Figure 4.35**

d) remove locking ring 3 (Figure 4.36 a);
e) press axle 1 (Figure 4.36 a) with bearing 2 off gear 4 (Figure 4.36 б);
f) press bearing off axle;




**a)** **b)**

**Figure 4.36**

g) press out shaft-gear 1 (Figure 4.37) together with bearingом and locking ring;
h) pull out gear 2;

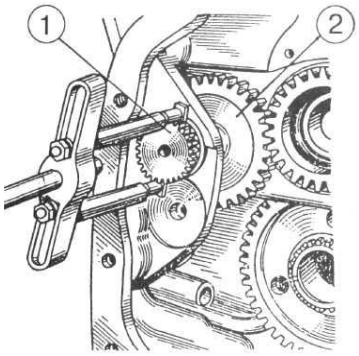



**Figure 4.37**

i) remove locking ring 1 (Figure 4.38);
j) press out bearing 2;

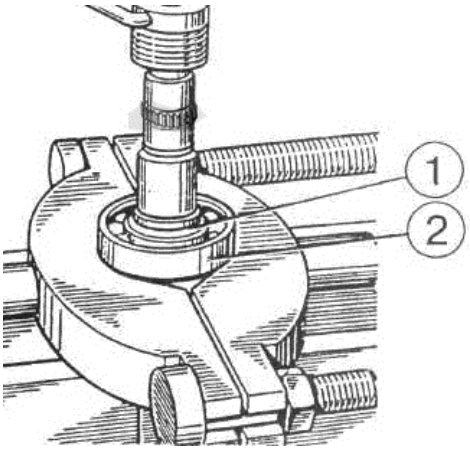



**Figure 4.38**

k) press bearing 1 (Figure 4.39) off clutch body.

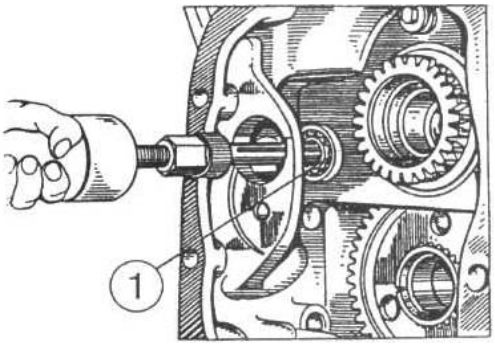



**Figure 4.39**

**To dismount driving gear of hinge hydraulic system pump** do the following:
a) unscrew bolt 2 (Figure 4.40) and remove thrust washer 3;
b) unscrew two bolts 1 and remove bar 4;

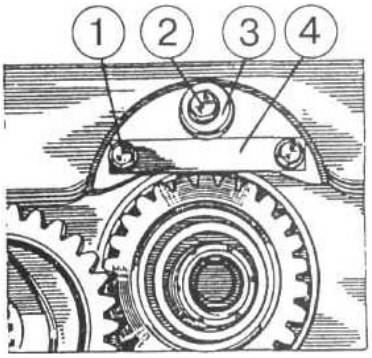



**Figure 4.40**

c) using knocker 1 (Figure 4.41) press gear axle off clutch body;

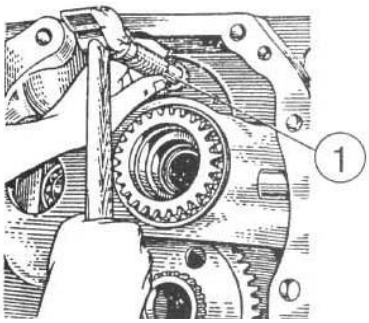



**Figure 4.41**

d) pull out gear 2 (Figure 4.42) with two bearings and two rings through upper hatch of clutch body;

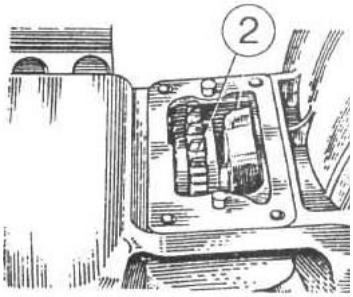



**Figure 4.42**

e) press bearing 1 (Figure 4.43) off gear;

f) turn gear over and press our the second bearing;

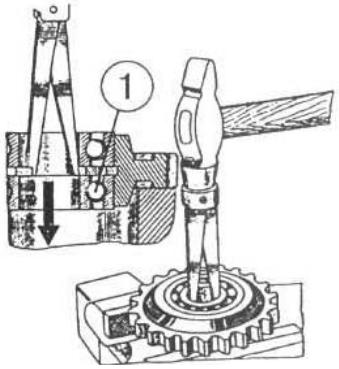



**Figure 4.43**

g) press out bushing 1 (Figure 4.44);

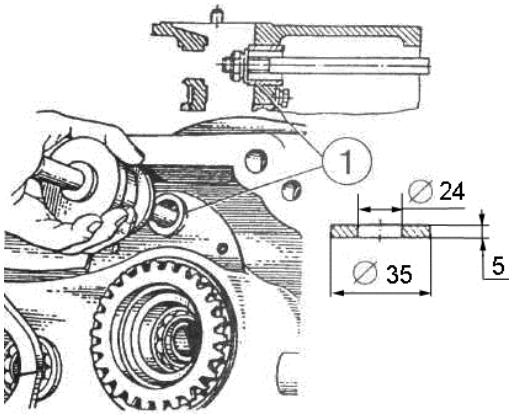



**Figure 4.44**

**To dismount shaft of driving PTO drive, tap arm** do the following:

a) unscrew three nuts 1 (Figure 4.45);

b) inside threaded openings of tap arm 2 screw technological bolts (M10 x30) 3 and using them press tap arm off clutch body;

c) remove oil catching washer;

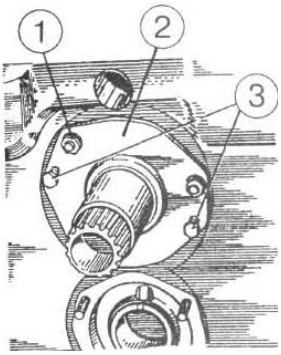



**Figure 4.45**

d) press off clutch body driving shaft of PTO drive 1 (Figure 4.46) with two bearings;

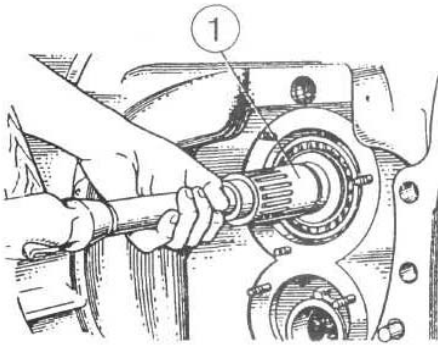



**Figure 4.46**

e) press sealing ring off tap arm (Figure 4.47);

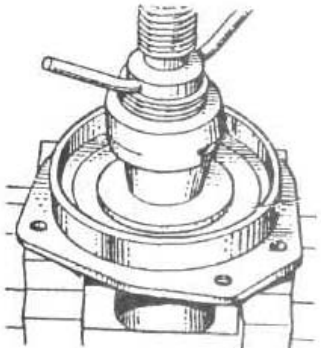


**Figure 4.47**

f) press bearing 1 off driving shaft of PTO drive (Figure 4.48);

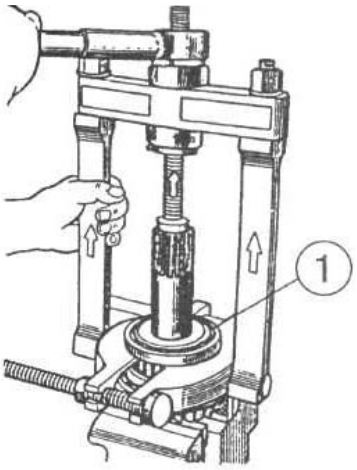



**Figure 4.48**

g) remove locking ring 1 from the shaft (Figure 4.49);

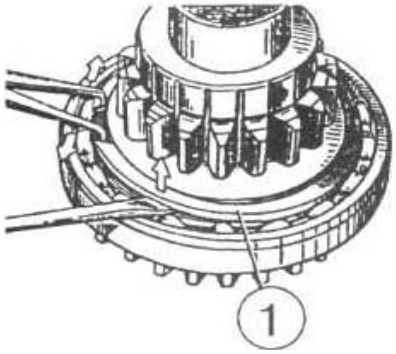



**Figure 4.49**

h) press the second bearing 2 off the shaft (Figure 4.50);

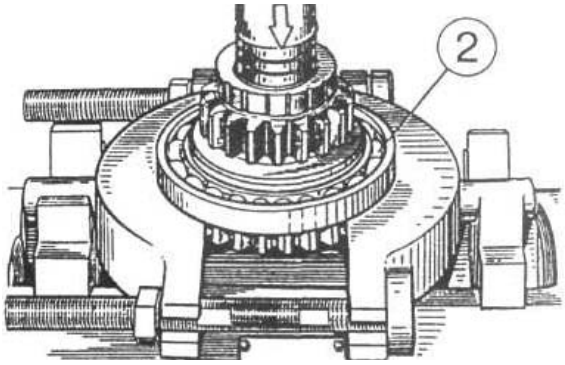



**Figure 4.50**

g) press sealing ring 1 (Figure 4.51) off the shaft of PTO drive.

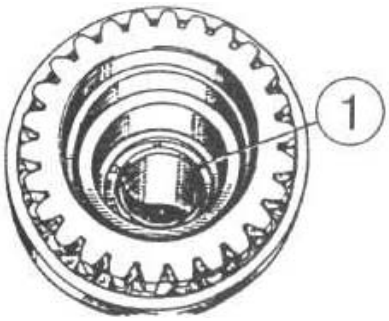



**Figure 4.51**

### 4.3.7 Assembly of clutch coupling body

Make assembly in sequence reverse to disassembly, and while doing so,:

a) lubricate with consistent grease cavities of sealing rings pressed inside tap arm and driving shaft of PTO drive, as well as friction surfaces of tap arm, surface of roller 4 (Figure 4.32).

b) gears and shafts must freely and without jams rotate in bearings.

c) tap of clutch coupling must move free and without jams across arm working surface lubricated with consistent grease.

d) limiting plate that fixes roller inside clutch must be tightened with bolt to the end.

e) tooth clutch that shifts PTO modes must travel free along shaft splines and come into engagement with driven gears.

f) yoke for tap control and yoke for shifting PTO gears must be firmly fastened on rollers. No swing yokes is allowed.

g) during assembly axle of driving gear of the hydraulic system pump with its eccentric head must move inside groove on clutch body, hindering axle turning through.

## 4.4 Gear box

### 4.4.1 Disassembly of gear box. Dismounting gear box

a) unscrew bolts 1 (Figure 4.52), remove cover 2 of GB control;

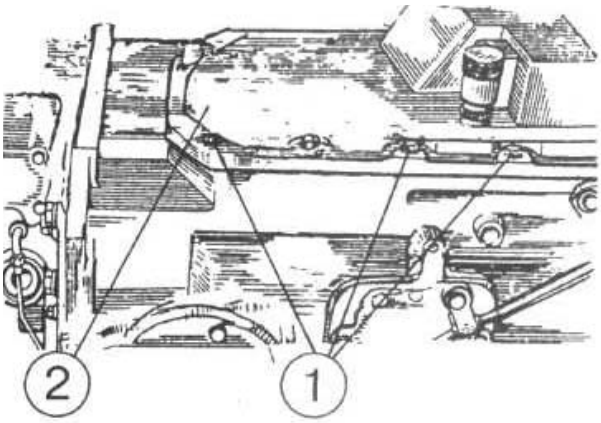



**Figure 4.52**

b) remove small collars 12 (Figure 4.53) anf disconnect hoses 13 of rear PTO drive;
c) unscrew bolts 5, 9 and dismantle pipelines: 4 lubrications of FDA bushing, pipeline 2 – lubrications of rear axle differential and 1 – interlocks of rear axle differential
d) disconnect electric wiring of electromagnetic valves 14 and sensors 10, 3;
e) disconnect pipe connection 6, bolts 7, using dismounting openings 8, remove cover 11;

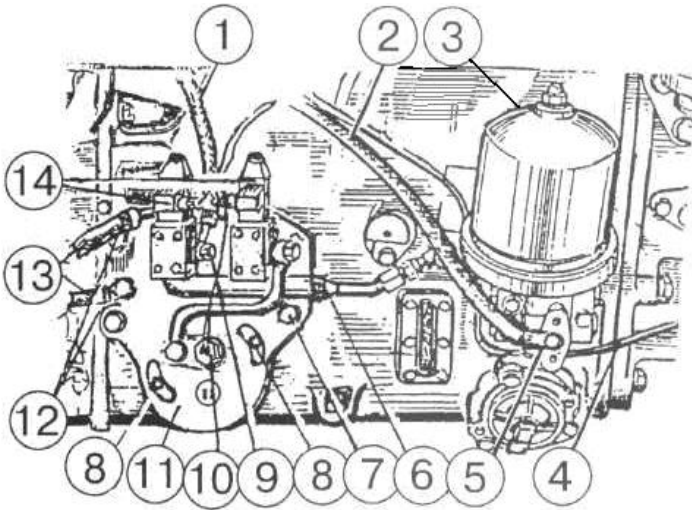



**Figure 4.53**

f) unscrew bolts 1 (Figure 4.54) and nuts for fastening gear box to rear axle body and clutch coupling body. Disconnect GB from clutch body and rear axle.

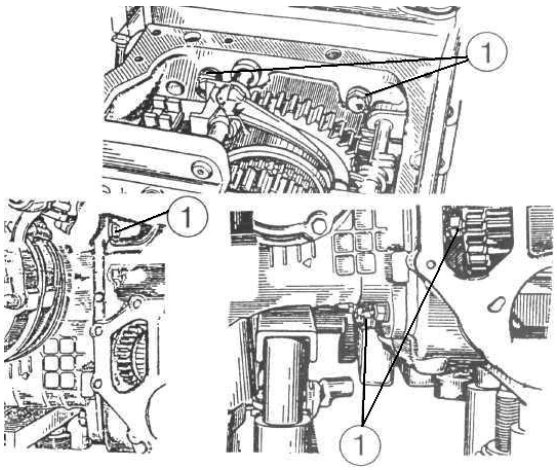



**Figure 4.54**

### 4.4.2 Dismounting hydraulic system units, gears' assembly and gear shifting yokes

a) unscrew bolts 1 (Figure 4.55) and dismount left side cover 2;

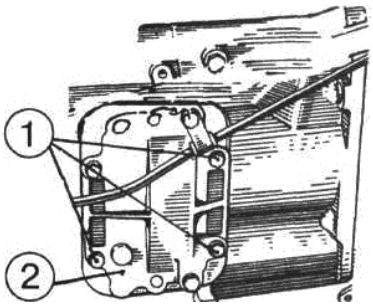



**Figure 4.55**

b) move lever for switching on transmission pump 1 (Figure 4.56) clockwise to the end;

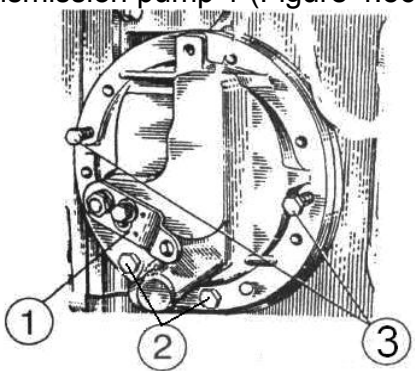



**Figure 4.56**

c) unscrew fastening bolts 2 (Figure 4.56), using dismounting bolts 3 remove pump drive 4 (Figure 4.57) as an assembly;

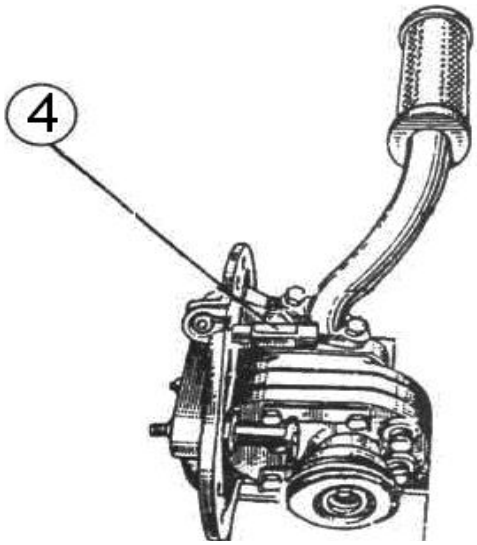



**Figure 4.57**

d) unscrew bolts 2 (Figure 4.58), dismantle filter-distributor 1, meshed filter 3 and spacers;

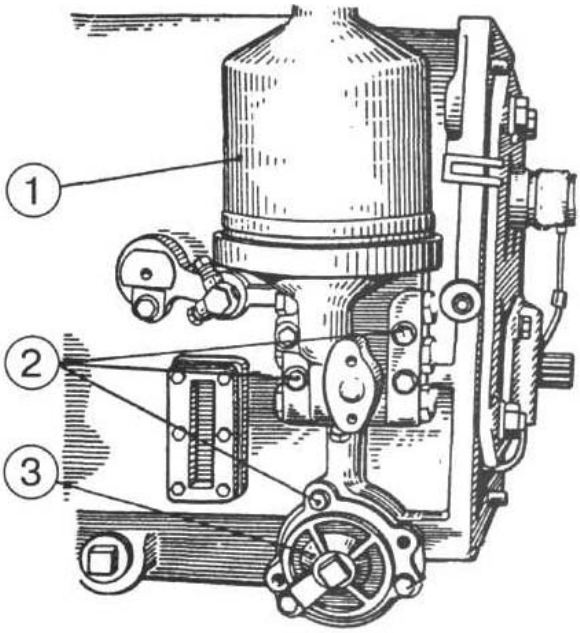



**Figure 4.58**

e) unscrew bolts 1 (Figure 4.59) and dismount yokes' body 2 as an assembly with yokes;

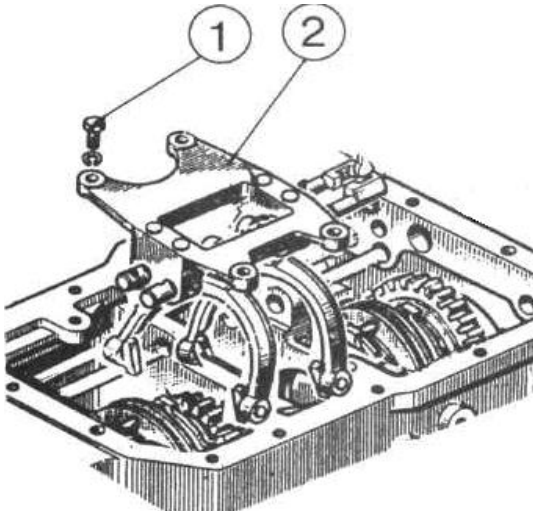


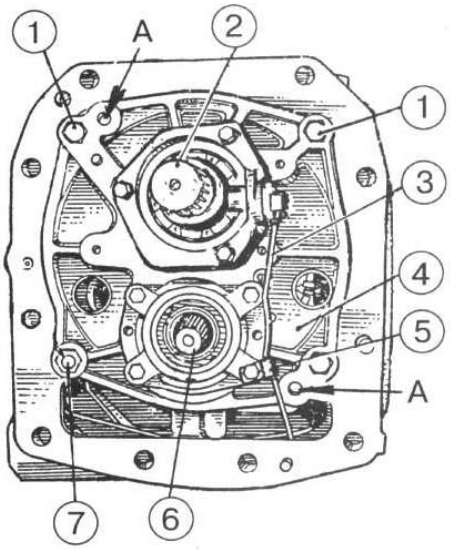

**Figure 4.59**

f) extract driving shaft of rear power-take-off 6 (Figure 4.60);

g) remove collars 5 and disconnect pipe 3 for lubrication supply to primary shaft 2;

h) unscrew bolts 1 and nut 7 for fastening cup 4 to GB body, screw two bolts in technological openings “A” of cup, and using them press unit of gears as an assembly off GB.

Unscrew bolts out of technological openings, in place of them screw in two eye-bolts and dismantle gears’ assembly.




A – technological opening; 1 - bolt; 2 – primary shaft; 3 – pipe for lubricant supply to primary shaft; 4 - cup; 5 - collar; 6 – PTO drive shaft; 7 - nut.

**Figure 4.60**

i) unscrew bolts 14, 15 (Figure 4.61) and switch off interlocks 8;

j) remove springs 6, 11, fixing elements 1, 10, pin 5, balls 2, 4, 9, 18, and axle 3;

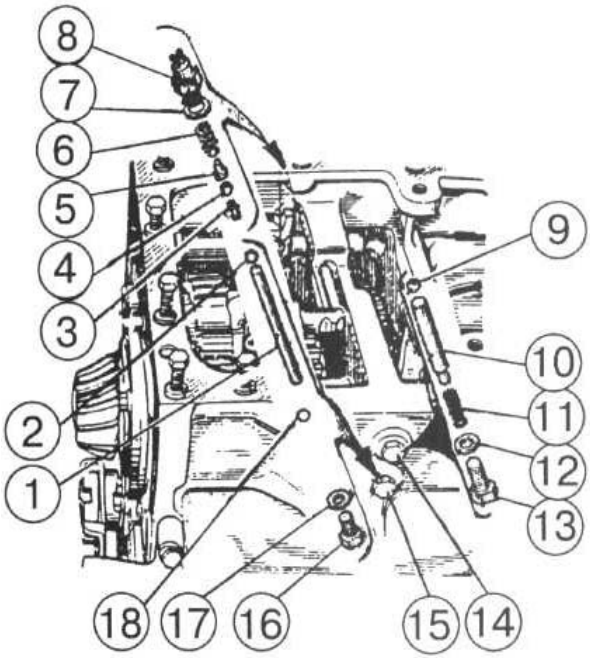



**Figure 4.61**

k) unpin and unscrew bolts 2 (Figure 4.62) of yokes 1 on leads 3, knock leads out of body and pull out yokes;

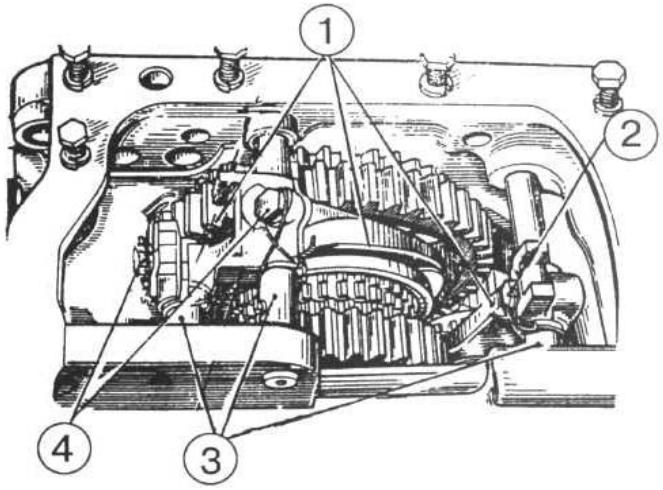



**Figure 4.62**

l) extract ball 3 (Figure 4.63), fixing element 2, spring 1 out of GB body under rear travel lead.

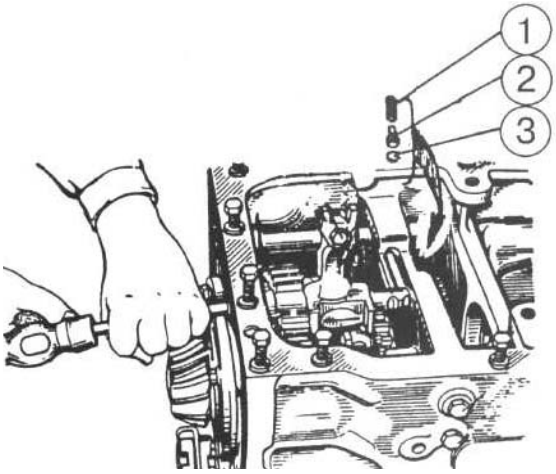



**Figure 4.63**

### 4.4.3 Disassembly of gears' assembly

a) unscrew bolts 1 (Figure 4.64) and remove bushing of lubricant conduit 3 , cover 2 , cup 4;
b) unscrew nuts 5, dismount thrust washers;

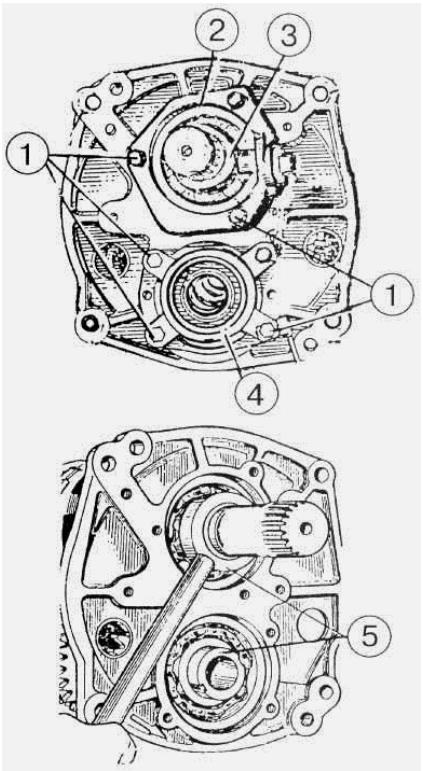



**Figure 4.64**

c) press cup 9 (Figure 4.65) together with bearings 6 off shafts 7 and 8;

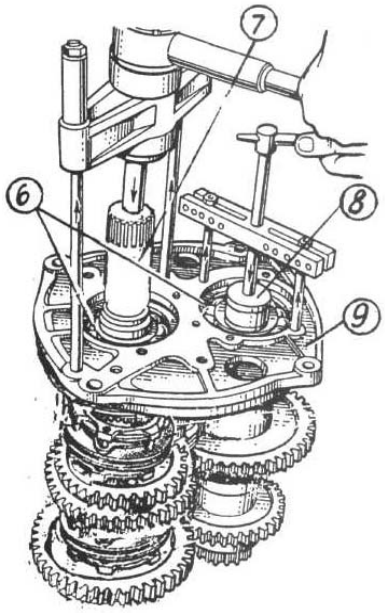



**Figure 4.65**

**Disassembly of primary shaft:**

a) remove washer 1 (Figure 4.66), gear 3, bearing 2, synchronizer 6;

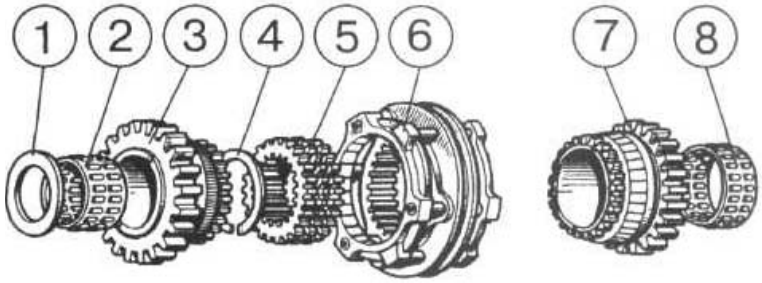



**Figure 4.66**

b) remove locking ring 4, press bushing of synchronizer 5, remove gear 7 and bearing 8;
c) press bearing 19 (Figure 4.68) off shaft 9 (Figure 4.67), bearing 17 (Figure 4.68), gear 16, synchronizer 13.

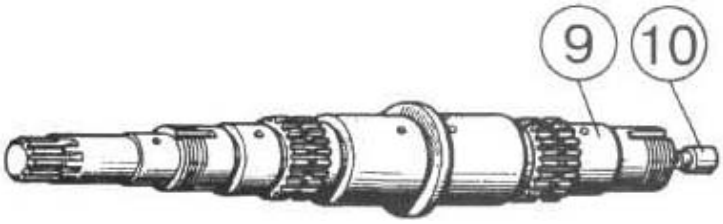



**Figure 4.67**

d) remove locking ring 15, bushing of synchronizer 14, bearing 11, gear 12.

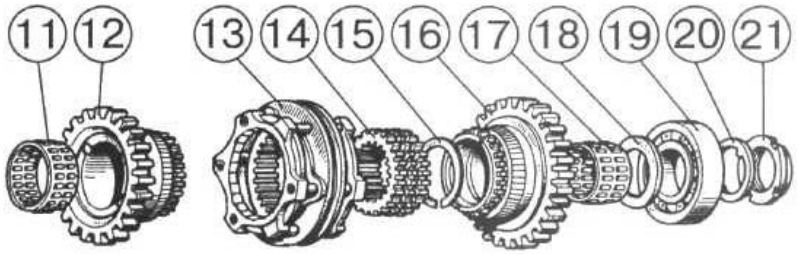



**Figure 4.68**

**Disassembly of intermediate shaft:**

a) press off intermediate shaft 5 (Figure 4.69) gears 1, 2, 3, 4;

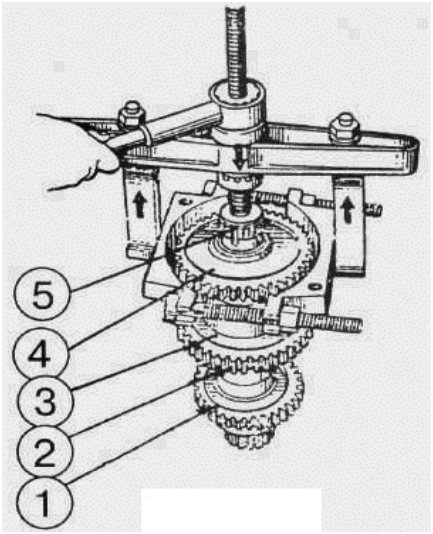



**Figure 4.69**

b) dismantle bushings 1 (Figure 4.70);

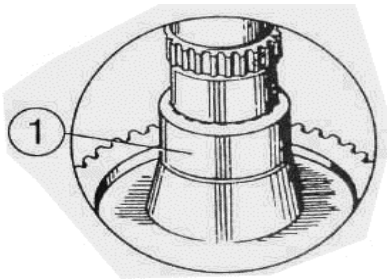



**Figure 4.70**

c) press off bearing 1 (Figure 4.71);

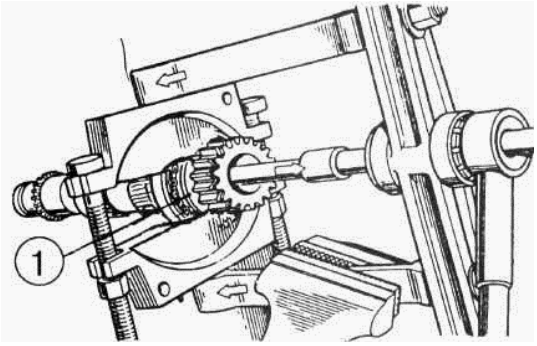



**Figure 4.71**

d) press off cup 3 (Figure 4.72) bearings 1 and 2.

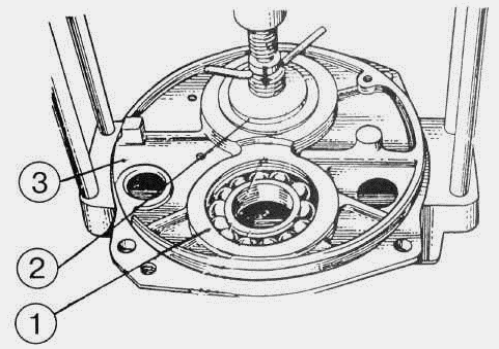



**Figure 4.72**

### 4.4.4 Disassembly of reduction gear section. Secondary shaft

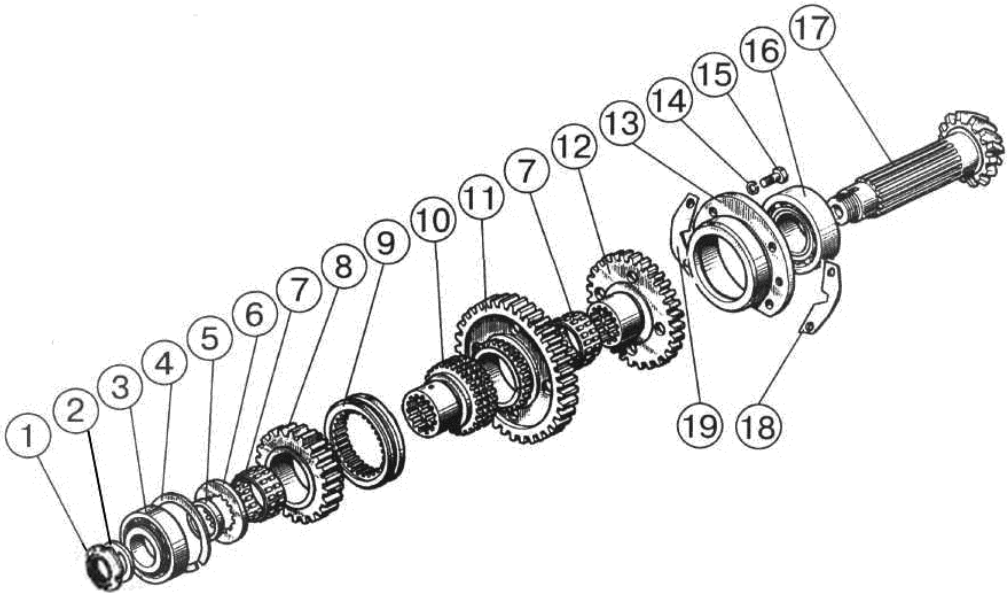



**Figure 4.73**

**To Figure 4.73:**

1 – nut; 2 – washer; 3 – bearing; 4 – ring; 5 – washer; 6 – washer; 7 – bearing; 8 – gear; 9 – clutch; 10 – bushing; 11 - gear; 12 - gear; 13 - seat; 14 - washer; 15 - bolt; 16 - bearing; 17 - shaft; 18 - spacer; 19 - spacer.

a) unscrew nut 1 (Figure 4.74) and knock out shaft 11 without damaging threaded section;

b) extract from body internal shell of bearing 2, washer 3, gears 5, 8 10 bushing 7, bearings 4 and 9, tooth clutch 6;

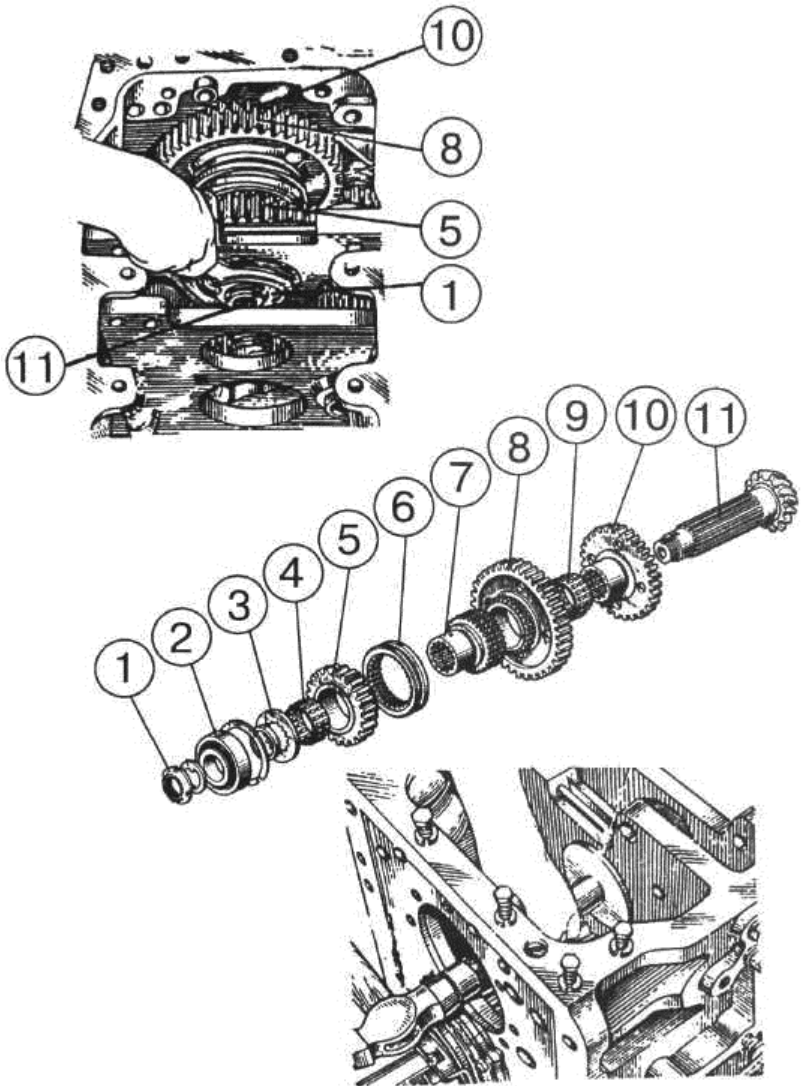



**Figure 4.74**

c) press external shell of bearing 2 (Figure 4.75) off box body;

d) unscrew bolts 1, screw two bolts in dismounting openings 2, then remove cup 3 and spacers 4;

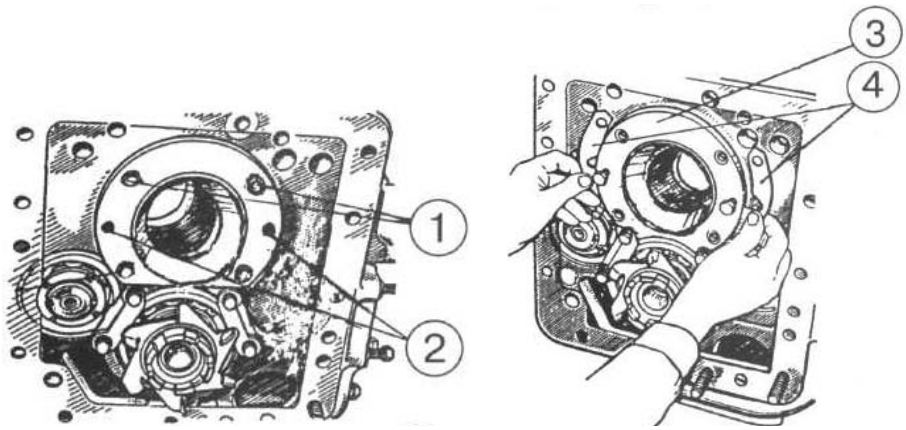



**Figure 4.75**

e) press off cup 1 (Figure 4.76) external bearing shell;

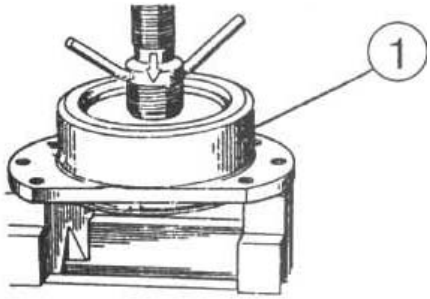



**Figure 4.76**

f) press off shaft 1 (Figure 4.77) internal shell of bearing 2.

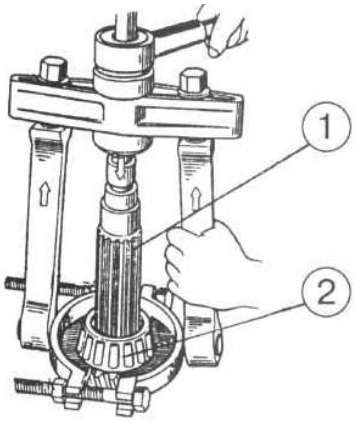
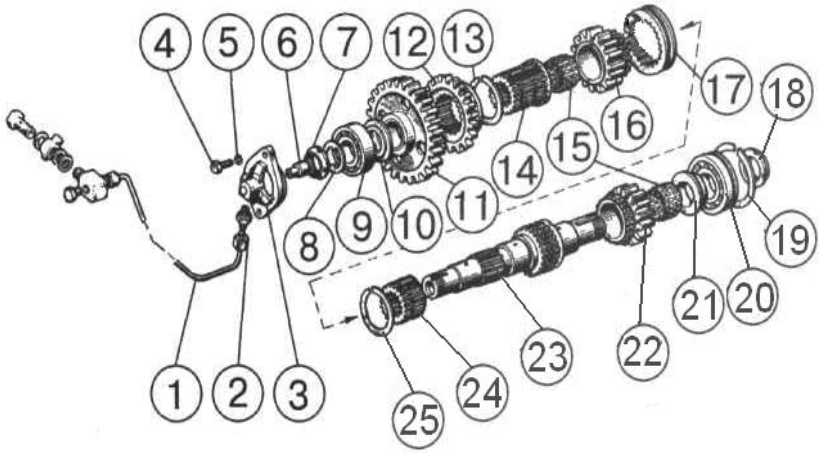



**Figure 4.77**

### 4.4.5 Disassembly of reduced gears' shaft




1 - pipe; 2 – pipe connection; 3 - cup; 4 - bolt; 5 - washer; 6 - throttle; 7 - nut; 8 - washer; 9 - bearing; 10 - washer; 11 - gear; 12 - gear; 13 - ring; 14 - bushing; 15 - bearing; 16 - gear; 17 - clutch; 18 - nut; 19 - ring; 20 - bearing; 21 - bushing; 22 - gear; 23 - shaft; 24 - bushing; 25 - ring.

**Figure 4.78**

a) unscrew cap nuts 1 (Figure 4.79) and dismantle pipeline 2;

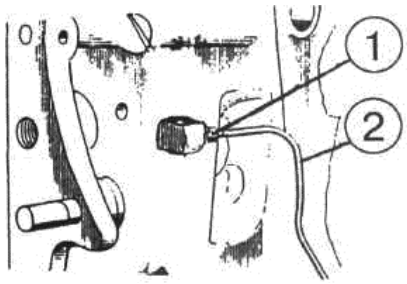



**Figure 4.79**

b) unscrew bolts 1 (Figure 4.80) and remove cup 2;

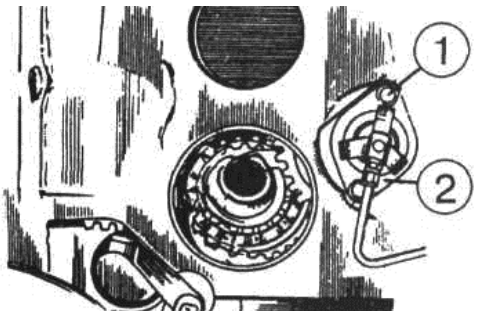



**Figure 4.80**

c) unscrew nut 1 (Figure 4.81) and remove cup 2;

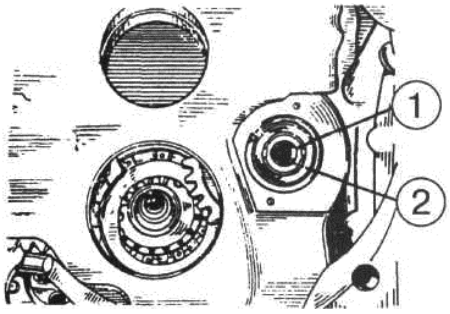



**Figure 4.81**

d) unscrew bolts 1 (Figure 4.82) and remove locking bars 2;

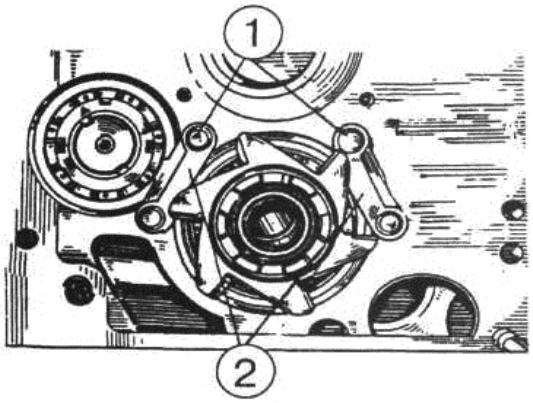



**Figure 4.82**

e) knock out shaft 1 (Figure 4.83) so that to remove locking ring 2;

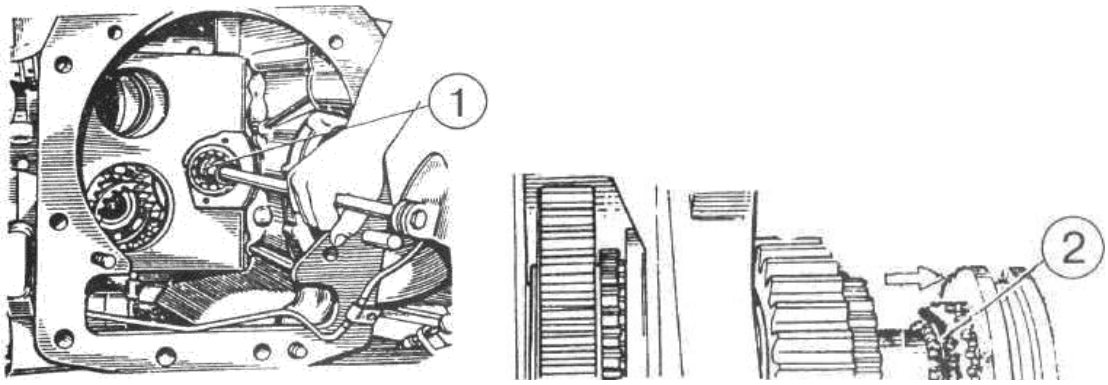



**Figure 4.83**

f) knock out shaft with bearings, bushing and nut, as shown in figure 4.84;

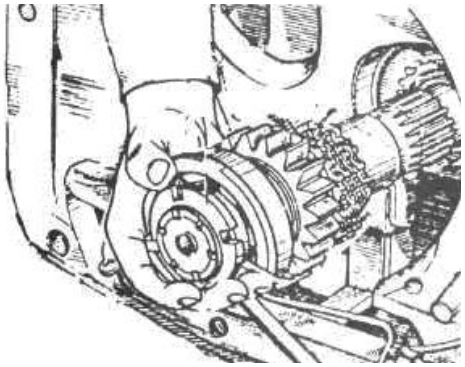


**Figure 4.84**

g) extract from GB body gears, bushings and tooth clutch (Figure 4.85);

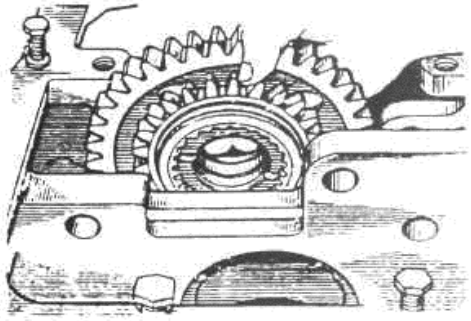


**Figure 4.85**

h) unscrew nut 1 (Figure 4.86);
i) press bearing 2 off shaft;
j) remove bushing 3, bearing 4.

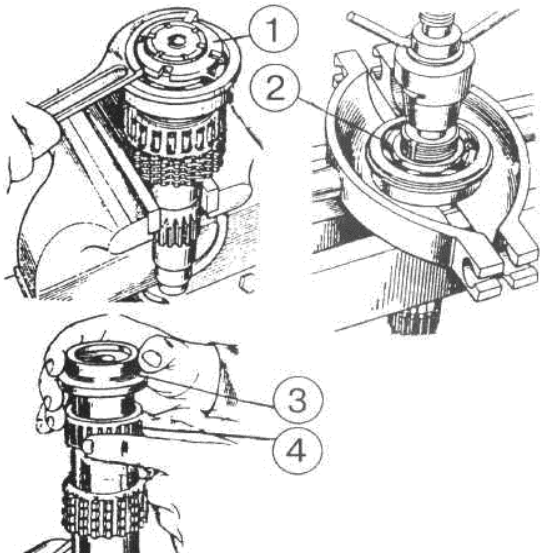
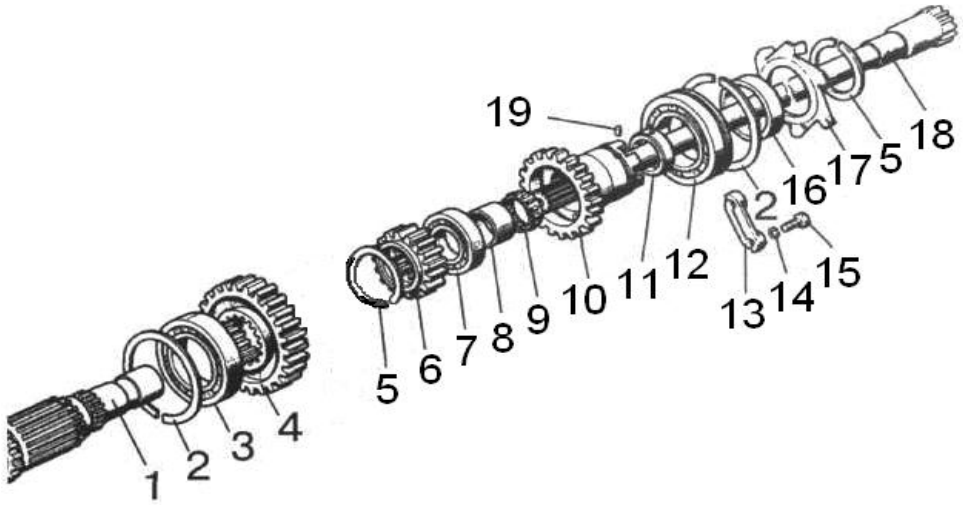



**Figure 4.86**

### 4.4.6 Disassembly of gear train shaft




1 – shaft; 2 – ring; 3 – bearing; 4 – gear; 5 – ring; 6 – gear; 7 – bearing; 8 – bushing; 9 – bearing; 10 – gear; 11 – bushing; 12 – bearing; 13 – bar; 14 – washer; 15 – bolt; 16 – bushing; 17 – impeller; 18 – PTO drive shaft; 19 – pin.

**Figure 4.87**

a) remove locking ring 2 (Figure 4.88) and impeller 1;

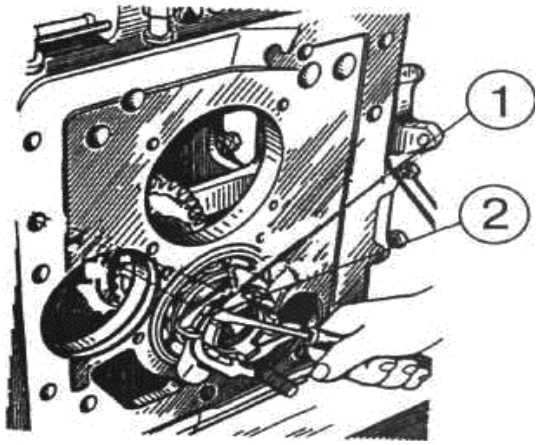



**Figure 4.88**

b) press off gear 1 (Figure 4.89) as an assembly with bearings and bushing;

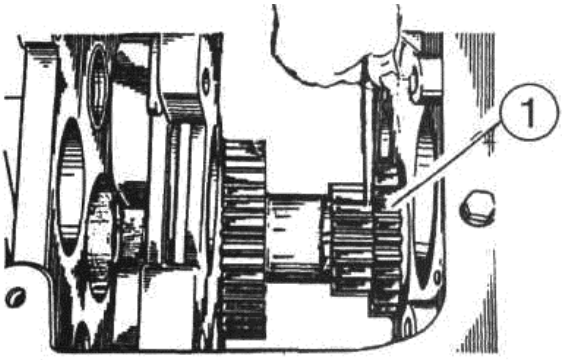



**Figure 4.89**

c) press bearing 1 (Figure 4.90) off gear 2;

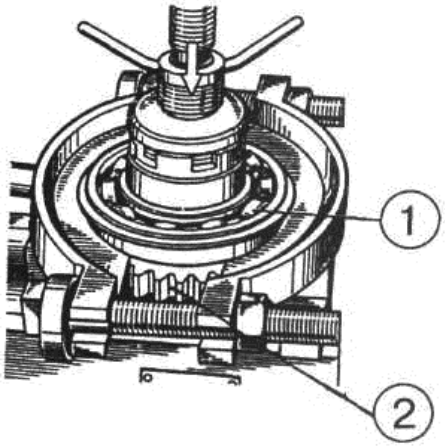



**Figure 4.90**

d) through opening in gear 1 (Figure 4.91) press external shell of bearing 2 off gear boring, extract bushing 4 and bearing 3;

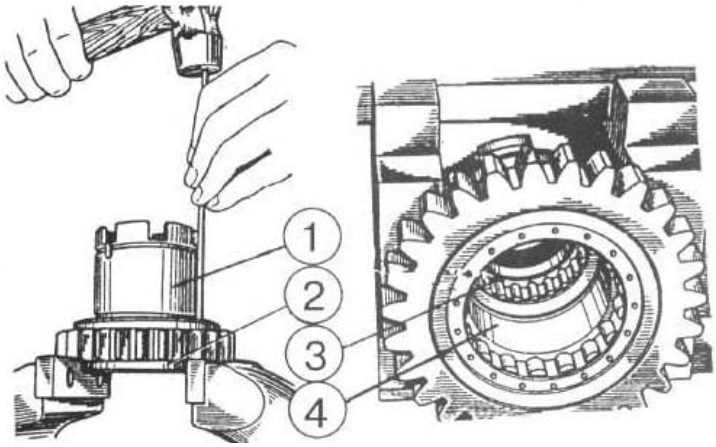



**Figure 4.91**

e) using puller press off shaft 1 (Figure 4.92) gear 2 with internal bearing shell;

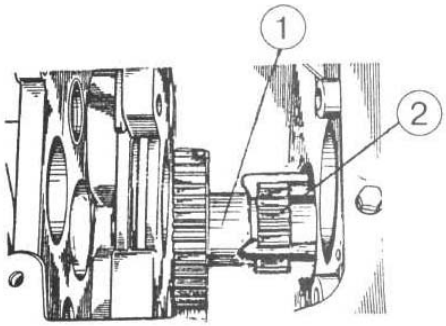



**Figure 4.92**

f) remove locking ring 1 (Figure 4.93), knock out shaft 2, extract gear 3;

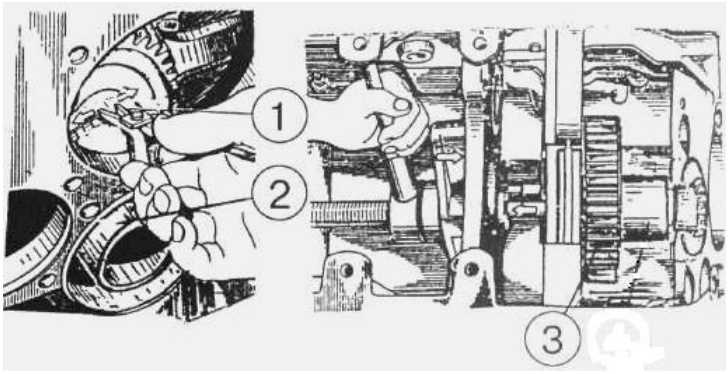



**Figure 4.93**

**Dismount FDA drive in accordance with recommendations of section "Disassembly of FDA drive"**

a) press out bearing 1 (Figure 4.94).

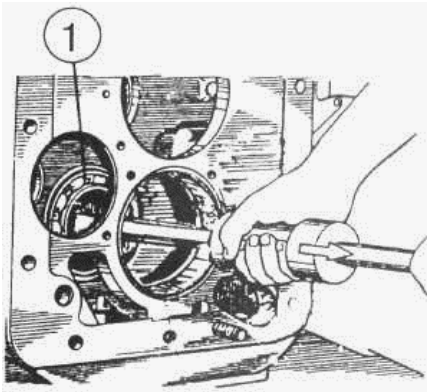



**Figure 4.94** Disassembly of control mechanism of range 3 - 4

b) unpin washer 2 (Figure 4.95) and unscrew bolt 3, dismantle yoke 1;

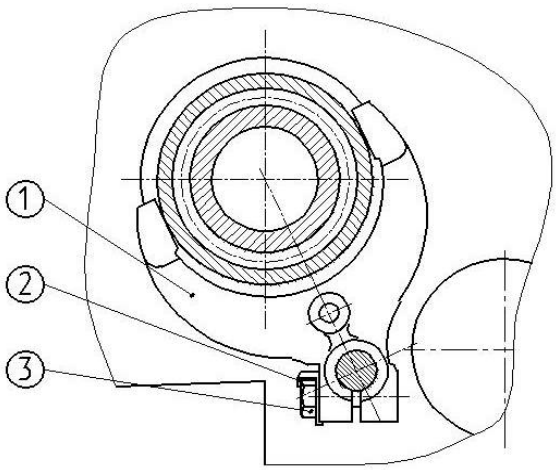



**Figure 4.95**

c) unscrew bolt 11 (Figure 4.96) and extract washer 12, spring 10, guide 9, ball 8 and lead 7;

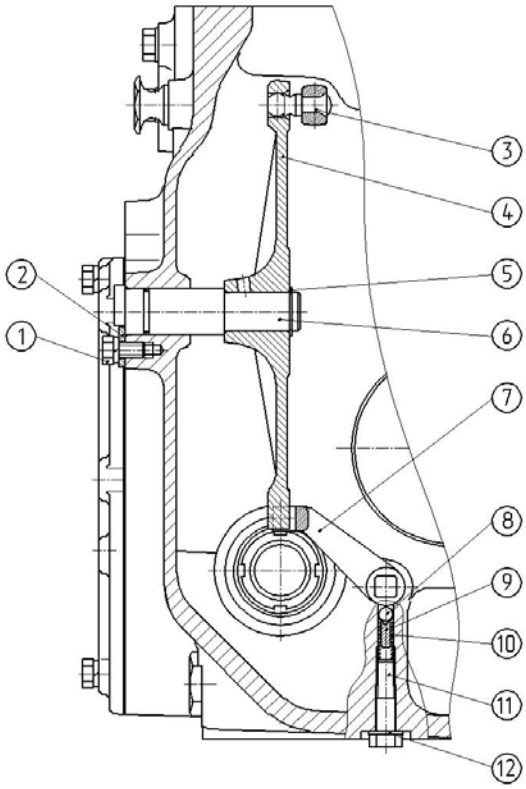
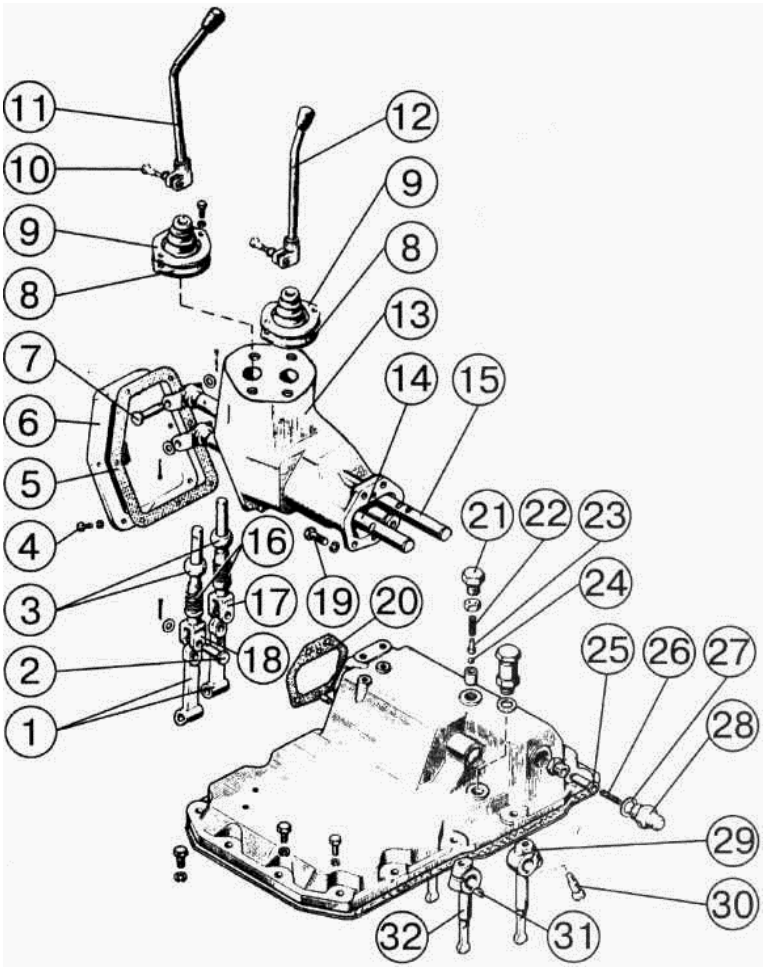



**Figure 4.96**

d) remove locking ring 5, unscrew bolt 1 and remove plate 2;
e) knock out axle 6, remove rocker 4 and extract lead 3.

### 4.4.7 Disassembly of control mechanism

a) unscrew bolts 4 (Figure 4.97), remove cover 6 and spacer 5;
b) dismantle clamps 9 and sheathes 8;
c) unpin pin and knock out pins 2, 7;
d) pull out levers 1, remove yokes 17, 18 and springs 16;
e) extract spherical joints 3;
f) unscrew bolt 21, pull out springs 22, guide 23 and ball 24;
g) unscrew bolts 30 for fastening levers 29 and 32, extract bosses 31, extract shafts 14 and 15, levers 29, 32;
h) unscrew limiting member 28, remove washer 27, pull out spring 26, fixing element 25;
i) unscrew bolts 19, remove body 13 and spacer 20.




1 - lever; 2 - pin; 3 - joint; 4 - bolt; 5 - spacer; 6 - cover; 7 - pin; 8 - sheath; 9 - clamp; 10 - bolt; 11 - lever; 12 - lever; 13 - body; 14 - shaft; 15 - shaft; 16 - spring; 17 - yoke; 18 - yoke; 19 - bolt; 20 - spacer; 21 - bolt; 22 - spring; 23 - guide; 24 - ball; 25 – fixing element; 26 - spring; 27 - ring; 28 - limiter; 29 - lever; 30 - bolt; 31 - boss; 32 - lever.

**Figure 4.97**

### 4.4.8 Assembly of gear box

Assembly GB in reverse order.

Parts must be washed. Bearings, balls and friction bushings must be lubricated with oil.

**Torques of boltов:**

**8** – 1.4...1.7 kgf m;
**10** - 3...3.5 kgf m;
**12** - 5...6 kgf m;
**16** - 12.. .14 kgf m;
**18** - 16...19 kgf m;
**20** - 23.. .27 kgf m;

**Adjustments:**

a) end face of conical bearing 12 (Figure 4.98) must be located 15 $_{-0,15}$.mm away from GB rear end face. Adjustment is made by putting necessary amount of spacers under cup flange 11, with nut 3 torqued to 22…30 kgf m, and adjustment washer 5 being removed.

b) tension of conical bearings 4 and 12 is adjusted by placing adjustment washers 5 of necessary thickness. Thus moment of resistance to rotation of secondary valve 13 must be M = 0.5...0.7 kgf m. Before checking moment of turning through, knock end faces of shaft 13 with copper knocker.

- If moment of resistance to shaft rotation is larger of set value, washer 5 must be of larger thickness.
- If moment of resistance to shaft rotation is smaller of set value, washer 5 must be of smaller thickness.

c) torque nut 3 to 22...30 kgf m and centre-pop in grooves of shaft 13.

**During assembly of GB pay attention to:**

When installing gears' assembly:

- Between end face of gear 16 and end face of bearing 15 place a device excluding skew of external shell of bearing.
- Using lifting mechanism lower gears' assembly inside gear box body.
- See that clutch 14 and yoke driving it were put put om gear train, and when mounting gears' assembly splines of clutch 14 came into engagement with splines intermediate shaft 17.
- As soon as external shell of bearing 15 starts being pressed inside GB body, remove device excuding its skew. Complete mounting gears' assembly inside GB body controlling that cup 19 of gears' assembly fits GB plane. Unscrew eye-bolts. Fasten gears' assembly with bolts.

When mounting body of yokes split keys of yokes 2 must be inserted in groove of synchronizers' carriage 1.

When mounting control cover: lever 6 must be installed in groove of lead 8, lever 7 must be installed in groove of yoke 9.

In fully assembled gear box:

- Fixing elements must securely lock yokes in neutral and engaged positions.
- After tightening fastening nuts gears must freely rotate on shafts without jams.
- During rotation of tooth clutches and synchronizers yjere should be no signs of jams of switching yokes in circular grooves.
- Allowable moment of resistance to turning through of GB primary shaft 18 КП in neutral position of synchronizers should not exceed 0.15 kg m.

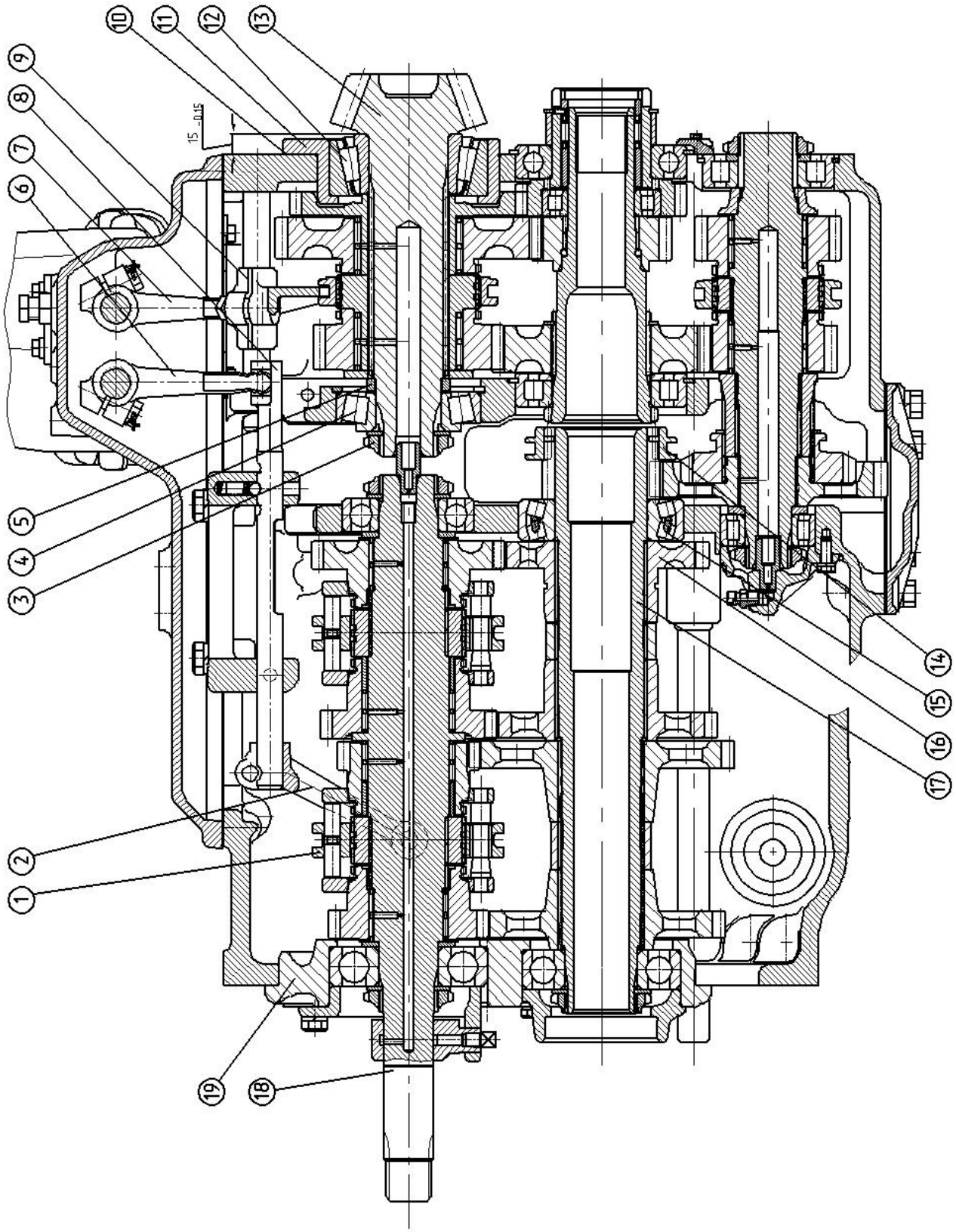



**Figure 4.98**

## 4.5 Rear axle

### 4.5.1 Disassembly of rear axle

a) unscrew cap nut 1 of oil line 5 (Figure 4.99);
b) unscrew bolts 2 for fastening housing 3 of interlock clutch of differential and foot brake;
c) dismantle housing 3 with adapter 4;
d) dismount clutch 6 for differential interlocking as an assembly;
e) dismount parking and foot brakes, see section **4.6** “Brakes”;
f) dismount rear wheel hubs, and for this:
1)unscrew bolts 1 for fastening inserts 3 (Figure 4.100);
2) while screwing bolts 1 in dismounting openings A dismount inserts 3 and hub 2;
3) unscrew bolts 1 out of dismounting openings.

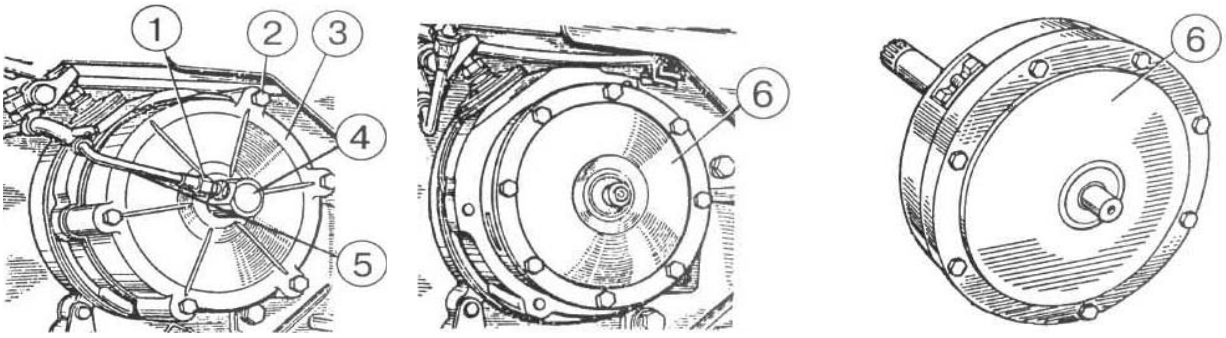



**Figure 4.99**

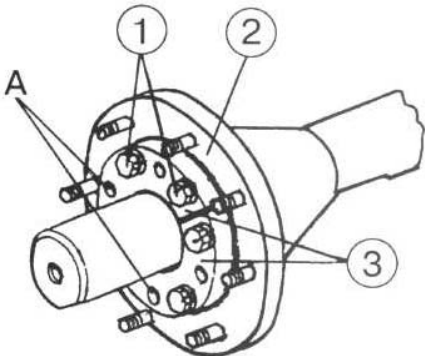
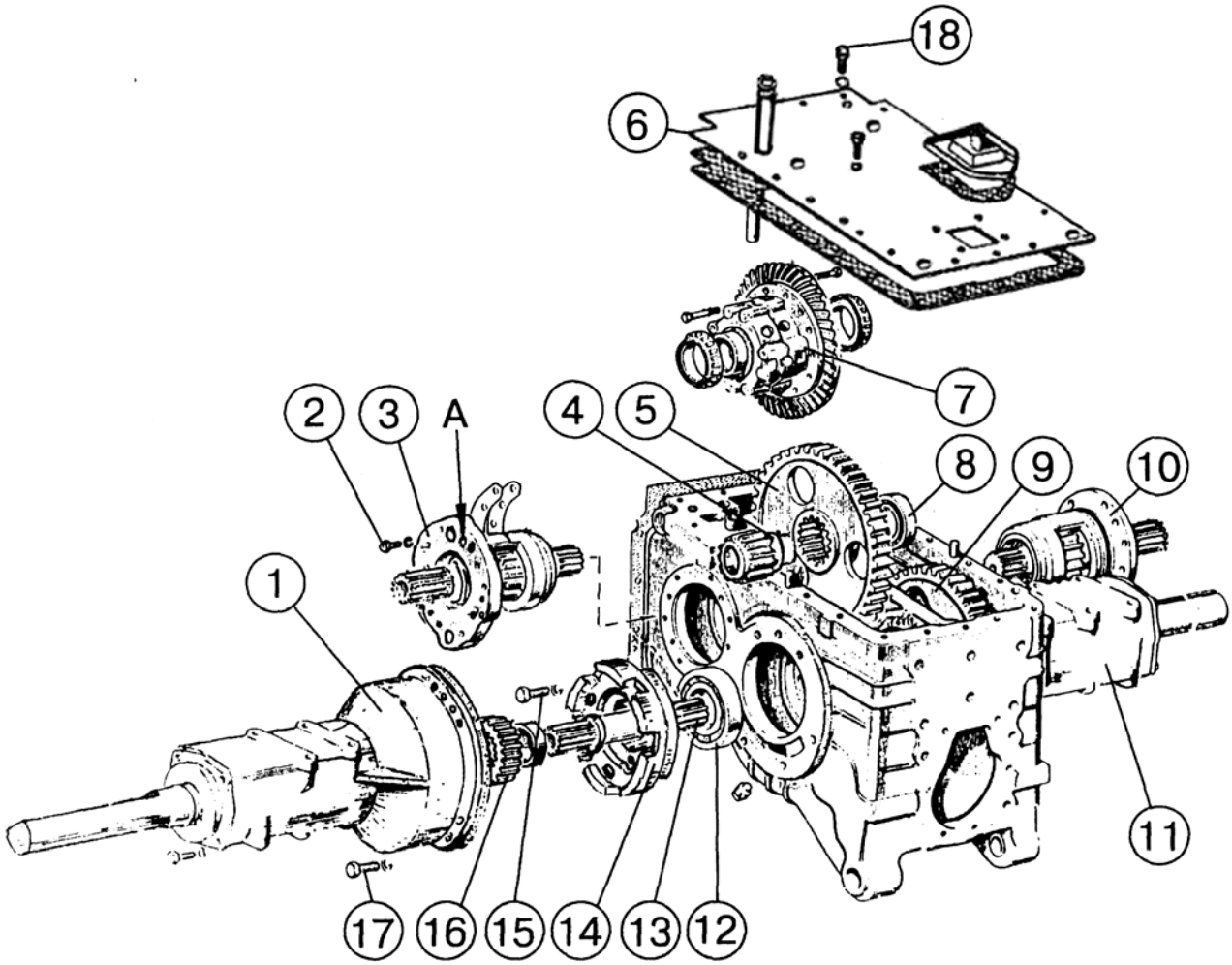



**Figure 4.100**

g) unscrew bolts 18 (Figure 4.101) of cover 6 of rear axle and dismount it;
h) unscrew bolts 2, screw them inside dismounting openings “A” of flanges of cups 3, 10;




A – dismounting opening; 1 – left-side sleeve of half-axle; 2 – bolt; 3 – left-side cup; 4 – bushing; 5 – driven gear; 6 – cover; 7 – differential as an assembly; 8 – bearing; 9 – driven gear; 10 – right-side cup; 11 – right-side sleeve of half-axle; 12 – ball bearing; 13 – shaft-torsion; 14 – cup; 15 – bolt; 16 – sun gear; 17 – bolt; 18 – bolt.

**Figure 4.101**

i) press cups off bridge body and dismount differential 7;

**ATTENTION!** Cups 3, 10 are dismantled without dismounting gears 5, 9 of main drives.

j) unscrew bolts 17 for fastening sleeves 1, 11, screw bolts inside dismounting openings of sleeves' flanges and dismount sleeves as an assembly with half-axles and final drives;

k) dismount shaft-torsions 13 as an assembly with sun gears 16;

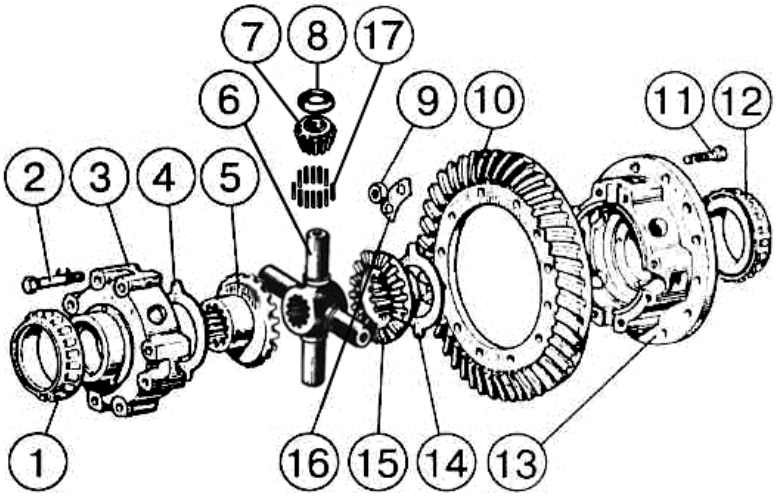
l) unscrew bolts 15 for fastening cups 14, screw bolts in dismounting openings of cups' flanges and dismount them as an assembly with bearings;

m) remove bushings 4, dismount gears 5, 9;

n) press bearings 8 off bridge body.

**Differential**

a) fix differential as an assembly in bench vice or special device;
b) unscrew bolts 2 (Figure 4.102), disconnect cover 3 of differential and remove it;
c) remove washer 4, gear 5;
d) pull out cross-piece 6 with satellites 7, washers 8 and rollers 17;
e) extract gear 15 and washer 14;
f) unbend locking plates 16, unscrew nuts 9 and remove gear 10;




1 – bearing; 2 – bolt; 3 – differential cover; 4 – washer; 5 – half-axle gear; 6 – cross-piece; 7 – satellite; 8 – washer; 9 – nut; 10 – driven gear; 11 – bolt; 12 – bearing; 13 – body; 14 – washer; 15 – half-axle gear; 16 – locking plate; 17 - rollers.

**Figure 4.102**

g) using puller (Figure 4.103) press out inside rings of bearings 1, 12.

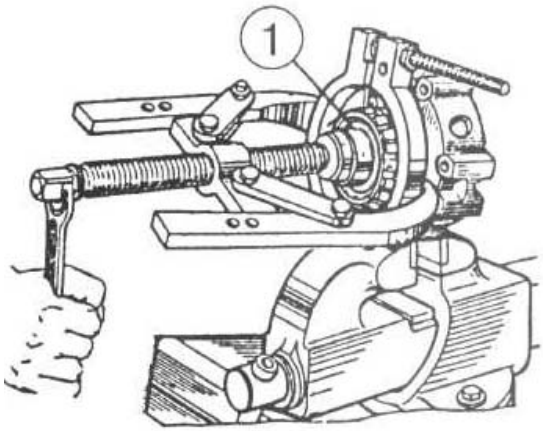
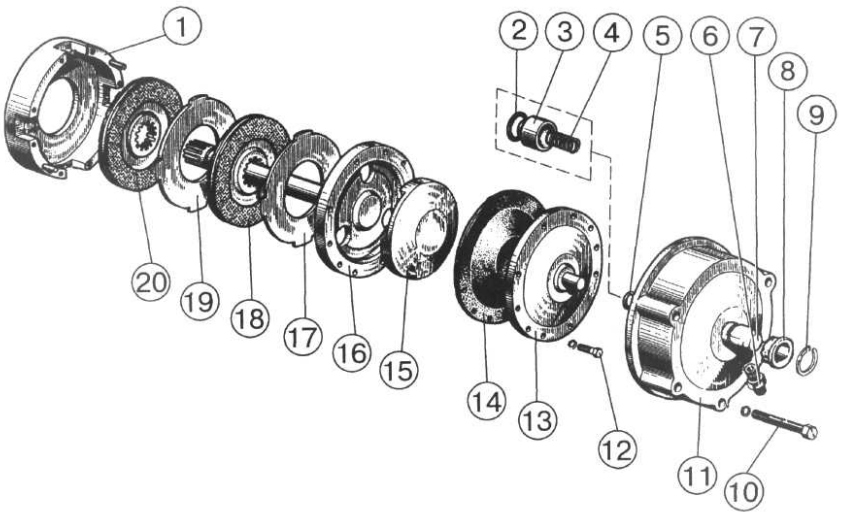



**Figure 4.103**

**Differential interlocking clutch**

a) unscrew bolts 12 (Figure 4.104);
b) remove cover 13, diaphragm 14, squeeze disk 15, shaft 16, disks 17, 18, 19, 20;




1 – body; 2 – ring; 3 – bushing; 4 – spring; 5 – ring; 6 – connection pipe; 7 – adapter; 8 – sealant; 9 – ring; 10 – bolt; 11 – housing; 12 – bolt; 13 – cover; 14 – diaphragm; 15 – pressure disk; 16 – shaft; 17 – squeeze disk; 18 – friction disk; 19 – ptressure disk; 20 – friction disk.

**Figure 4.104**

c) unscrew connection pipe 6 (Figure 4.105) off adapter 7;
d) remove locking ring 9, sealant 8, adapter 7;

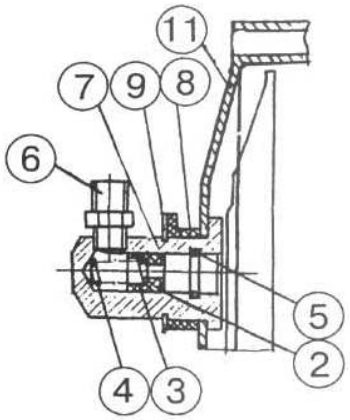


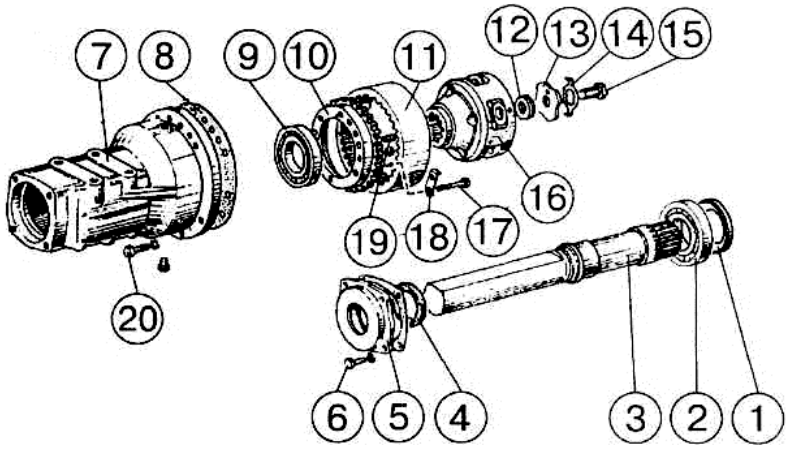

**Figure 4.105**

e) pull out of adapter ring 5, bushing 3 with ring 2, spring 4;
f) remove ring 2 off bushing 3.

**Final drive**

a) fix half-axle 3 (Figure 4.106) to prevent turning through;
b) remove locking washer 14, unscrew 15 and dismount carrier as an assembly;
c) remove crown gear 11;
d) unbend locking plates 18 and unscrew bolts 17;
e) screw two bolts Ml8 inside dismounting openings of hub flange 10;
f) press it off splines 20;
g) unscrew bolts 6 and remove cover 5 with sealing ring 4;

Slightly knocking on inside end face of half-axle 3 through soft metal spacer (bronze, brass, aluminum) press half-axle off sleeve (out of internal shell of bearing 2), and dismount half-axle..




1 – ring; 2 – bearing; 3 – half-axle; 4 – sealing ring; 5 – cover; 6 – bolt; 7 – sleeve; 8 – spacer; 9 – bearing; 10 – hub; 11 – crown gear; 12 – spacers 0.2 mm, 0.5 mm; 13 – washer; 14 – washer; 15 – bolt; 16 – carrier as an assembly; 17 – bolt; 18 – plate; 19 – pin; 20 – bolt.

**Figure 4.106**

h) press sealing ring 4 off cover 5 (Figure 4.107) (use special device to press in sealing ring);

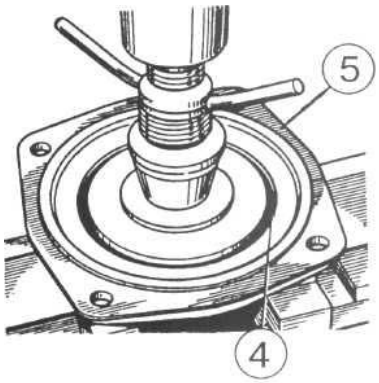



**Figure 4.107**

i) using inertion hammer press external shell of bearing 2 off sleeve 3, pull out ring 1 (Figure 4.108).

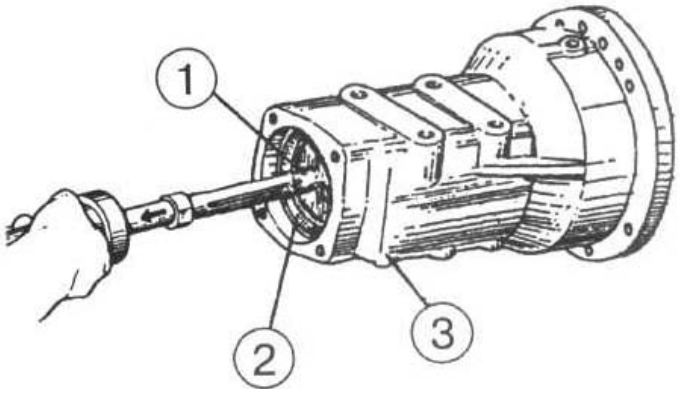
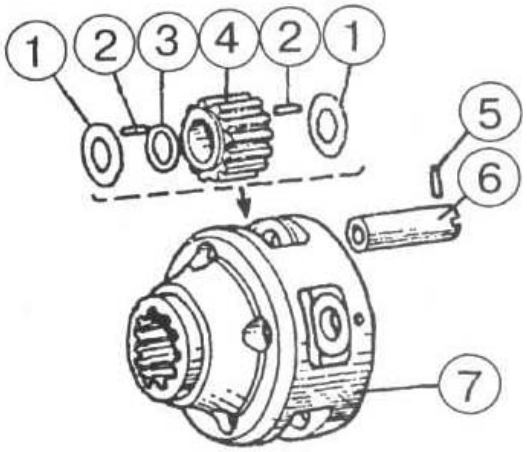



**Figure 4.108**

**Carrier**

a) using knocker knock out build-up pins 5 aiming to centre (Figure 4.109), via spacer of soft metal press out axles 6 of satellites;
b) remove washers 1, satellites 4, spacing rings 3, rollers 2 of satellite bearings.

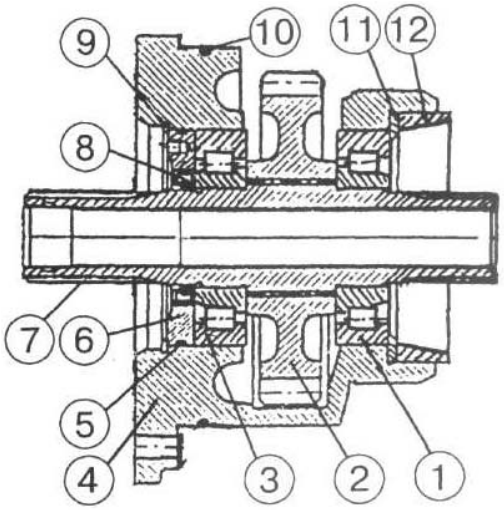



1 – washer; 2 – roller; 3 – ring; 4 – satellite; 5 – pin; 6 – satellite axle; 7 – carrier.

**Figure 4.109**

**Cup**

a) remove locking ring 9 (Figure 4.110);
b) remove sealing ring 10 from the cup;




1 – bearing; 2 – gear; 3 – bearing; 4 – cup; 5 – ring; 6 – shell; 7 – shaft; 8 – sealing ring; 9 – locking ring; 10 – sealing ring; 11 – thrust ring; 12 – external shell of bearing.

**Figure 4.110**

c) press out shell 6 with sealing ring as an assembly using puller and two dismountin threaded openining in shell;

d) remove from shell 6 (Figure 4.111) sealing ring 5 and press out sealing ring 8;

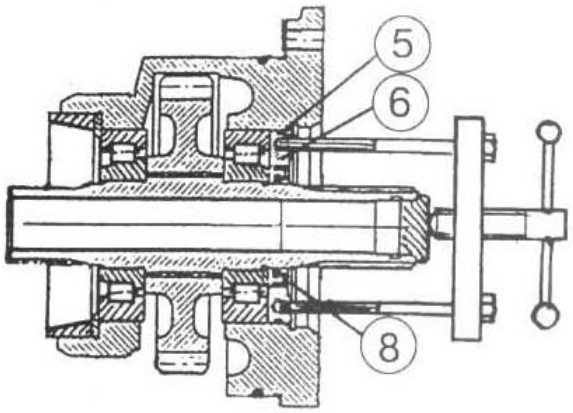



**Figure 4.111**

e) put glass on stand and press out shaft 1 (Figure 4.112) with bearing 3, thrust ring 4, shell of bearing 5;

f) pull out gear 2;

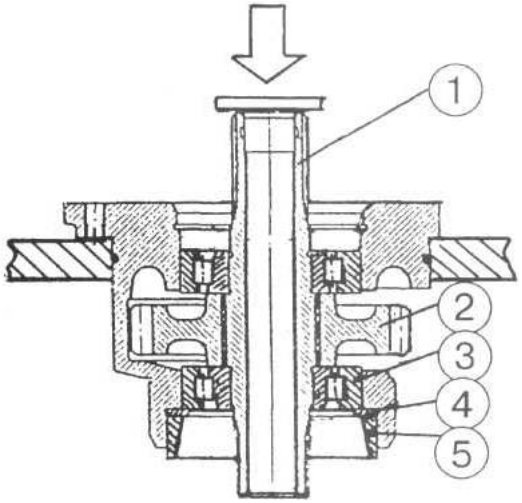



**Figure 4.112**

g) using gear 2 (Figure 4.113) and stand press off shaft 3 internal shell 1 of bearing;

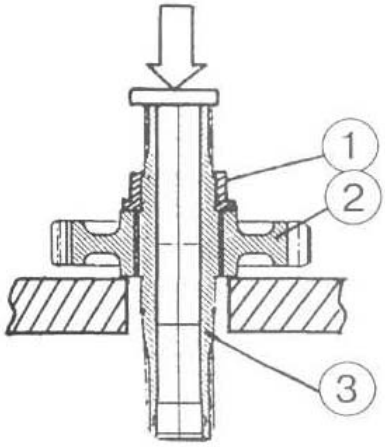



**Figure 4.113**

### 4.5.2 Assembly of rear axle

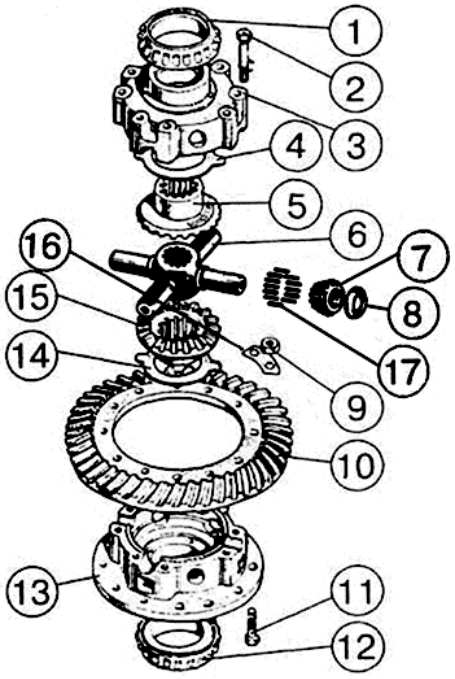
**Differential**

a) put differential body 13 (Figure 4.114) in vertical position using bench vice or a device;
b) put on differential body 13 gear 10, secure it with bolts 11, nuts 9 with locking plates 16;
c) put inside body 13 washer 14 (with convex side facing gear 15) and gear 15;
d) put on cross-piece 6 rollers 17, satellites 7, thrust washers 8 and place cross-piece insode differential body;
e) put on satellites gear 5 and washer 4 (with convex side facing gea 5);
f) put cover 3 on body 13, having aligned marks or numbers on body 13 and cover 3, tighten them with bolts with torque 75...80 N m (7.5...8 kgf/l);
g) press on body 13 and cover 3 inside rings of bearings 1, 12 to the end, having first heated them

in oil.

Check quality of assembly: insert in differential drive gear shaft of main drive and also check half-axle gear 5 which must turn through with satellites 7 and gear 15 without jams.

**ATTENTION!** Before starting the assembly lubricate washers 4 and 14, gears 5 and 15, pins of cross-piece 6, rollers 17, satellites 7 and washers 8 with transmission oil. Disassembly of differential body and cover is not allowed.




1 – bearing; 2 – bolt; 3 – differential cover; 4 – washer; 5 – gear; 6 –differential cross-piece; 7 – satellite; 8 – thrust washers; 9 – nut; 10 – driven gear; 11 – bolt; 12 – bearing; 13 – differential body; 14 – washer; 15 – gear; 16 – stop plate; 17 - rollers.

**Figure 4.114**

**Final drives**

a) press on half-axle 7 (Figure 4.115) inside ring of external bearing 5 heated in oil in advance, to half-axle collar to the end;

b) put in sleeve ring 9, using rims А and Б;

c) press inside sleeve 8 external rings of bearing 4 и 5 in sleeve rim to the end;

d) install hub 2 of crown 1 inside sleeve 8, fastening bolts and cotter pin them with locking plates; plates must overlap splines;

e) install half-axle 7 with bearing 5 inside sleeve 8 and press insode ring of bearing 4 heated in oil in advance;

f) install on half-axle splines carrier 3 as an assembly, washer 12 and torque 10 to 200...220 N m (20...22 kgf/l) without spacers 11, while turning half-axle for rollers of bearings to take proper position;

g) release bolt 10 and tighten it again by hand;

h) through opening in washer 12 measure clearance between end face of half-axle 7 and washer 12;

i) remove bolt 10, put stack of spacers 11 with thickness equal to clearance plus 0.1 mm and torque bolt 10 to 500...550 N m (50...55 kgf/l);

j) check moment of half-axle turning through (0.3...0.5 kgf/l), if necessary, correct it by changing number of spacers 11;

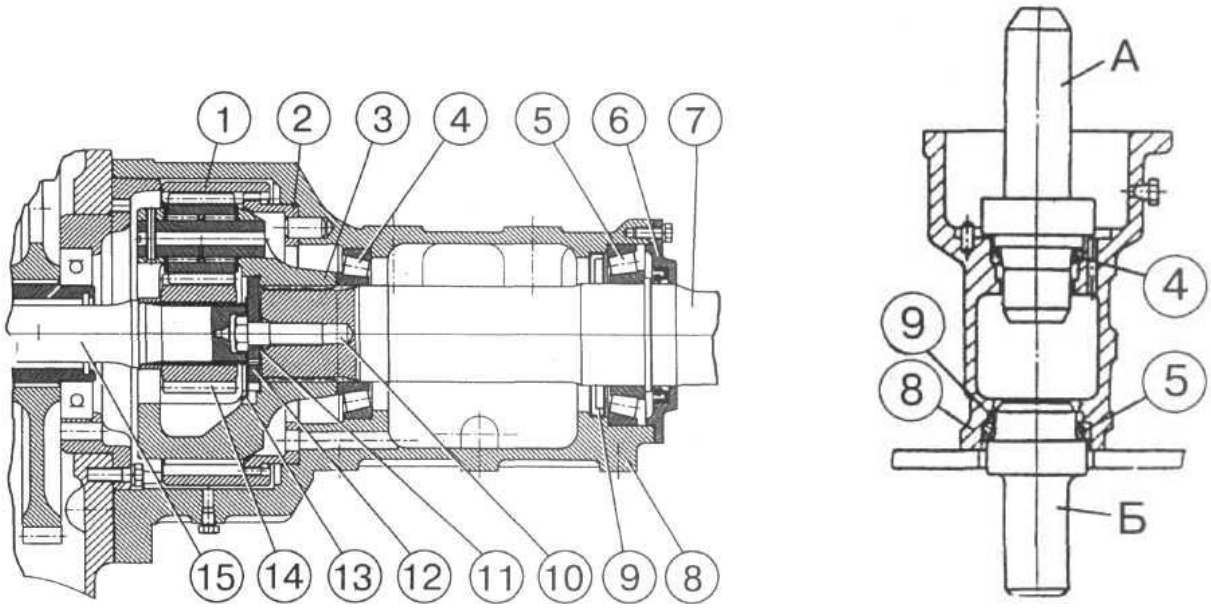
k) before checking the moment the half-axle should be set by applying effort, or hammered down to washer 12 by light knocks via rim made of soft metal; hammering down half-axle via head of bolt 10 is unacceptable;

l) secure bolt 10 with locking plate 13 (but first grease plane of plate that abuts washer 12 with LITOL-24) by putting plate 13 on head of bolt in such a way that whiskers of plate were inserted in grooves of carrier 3 (if necessary keep turning bolt to align the whisker and groove);

m) put crown gear 1 on hub teeth 2;

n) install sun gear 14 as an assembly with shaft-torsion 15 inside planetary mechanism; while turning shaft-torsion check how easily the mechanism is rotating;

o) mount cover 6 as an assembly with sealing ring, having first filled with grease LITOL-24.




1 – crown gear; 2 – crown gear hub; 3 – carrier; 4, 5 – bearings; 6 – cover; 7 – half-axle; 8 – sleeve; 9 – ring; 10 – bolt; 11 – adjustment shims; 12 – washer; 13 – locking plate; 14 – sun gear; 15 – shaft-torsion.

**Figure 4.115**

**Shaft-torsion**

a) mount bushing 3 (Figure 4.116) on splines of torsion 4 to the end on collar;

b) mount on splines of torsion 4 gear 2 and secure it locking ring 1.

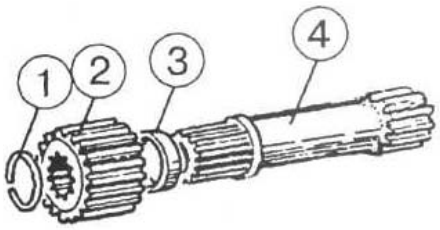



**Figure 4.116**

**Carrier, cup, clutch of differential interlock**

Make assembly of carrier, cup in sequence reverse to disassembly. The order of assembly and installation of differential interlock clutch is described in in section **4.6** “Brakes”

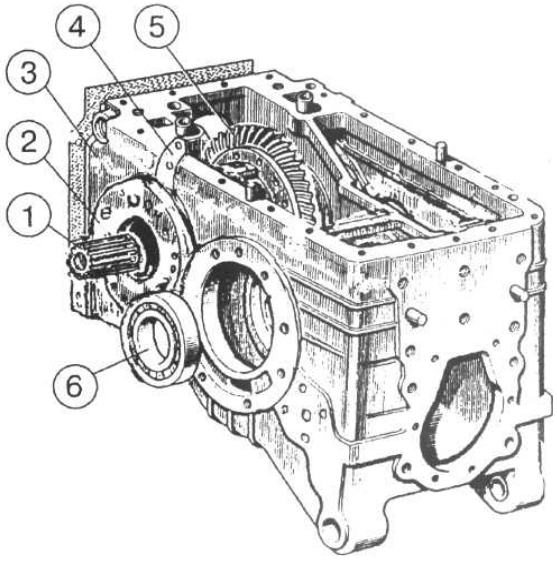
**General assembly of rear axle**

a) put cups 2 (Figure 4.117) as an assembly with drive shafts 1 inside borings of body 3, not bringing them to the end inside the body;

b) mount differential 5 as an assembly;

c) using adjustment shims 4 adjust tension of differential bearings;

Tension must be such that effort applied in order to turn the differential by the crown of driven gear was equal to 3...5 kgf.



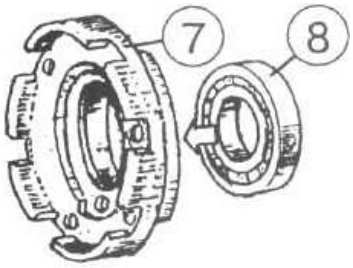

1 – shaft; 2 – cup; 3 body; 4 – adjustment shims; 5 – differential; 6 – bearing.

**Figure 4.117**

**ATTENTION!** Total thickness of diametrically opposite stacks of spacers must be identical.

d) insert bearings 6 inside borings of body 3 to the end;

e) press bearings 8 (Figure 4.118) inside seats of cups 7;

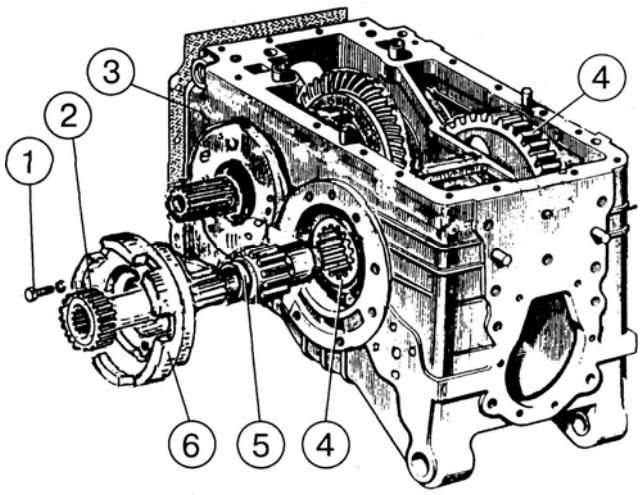



7 – cup; 8 – bearing.

**Figure 4.118**

f) while holding gears 4 (Figure 4.119), put bushings 5 in splines of gears 4 until bushings' splines touch the bearing;

g) put cups 6 with bearings in borings of body 3 and tighten with bolts 1 (M=8...10 kgf/l), put cups so that two drainage openings were located at the same height from body bottom (below half-axles);

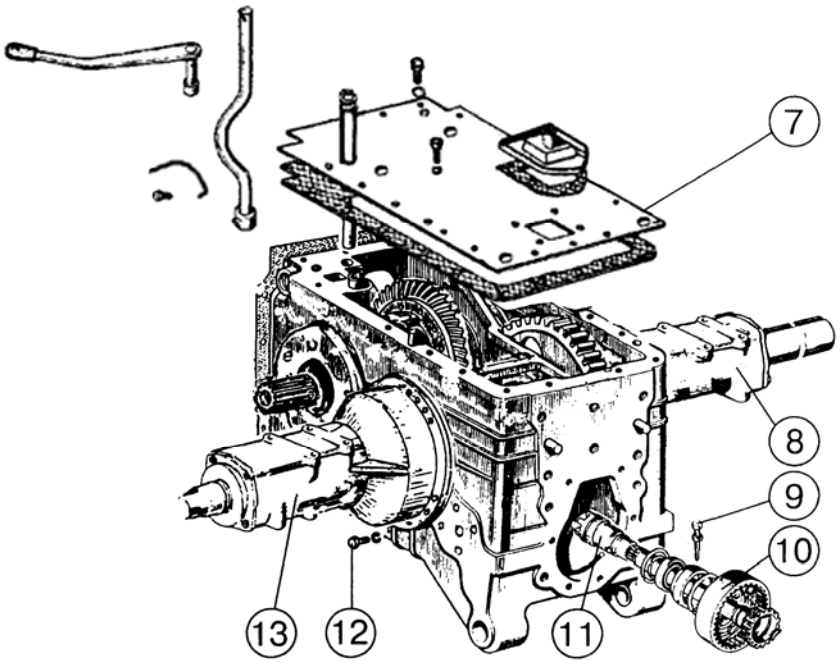



1 – bolt; 2 – shaft-torsion; 3 – body; 4 – gear; 5 – bushing; 6 – cup.

**Figure 4.119**

h) put crown gear 10 (Figure 4.120) of PTO drive as an assembly, and fix it with locking bolt 9 with check nut;

i) mount shaft-torsions 2 (Figure 4.119) as an assembly with sun gear of planetary mechanism of final drives;




7 – top cover; 8, 13 – sleeve; 9 – locking bolt; 10 – PTO crown gear; 11 - PTO drive clutch; 12 – bolt.

**Figure 4.120**

j) install sleeves 8 and 13 (Figure 4.120) as an assembly with planetary mechanisms and tighten them with bolts 12 (M=18...22 kgf/l);

k) mount knuckle clutch 2 (Figure 4.121) on shaft of PTO drive in extreme back position, bring carrier of roller 1 that shifts PTO operation modes, in its groove;

l) connect gear box to rear axle and adjust main drive (see section **4.5.3** “Adjustment of rear axle”);

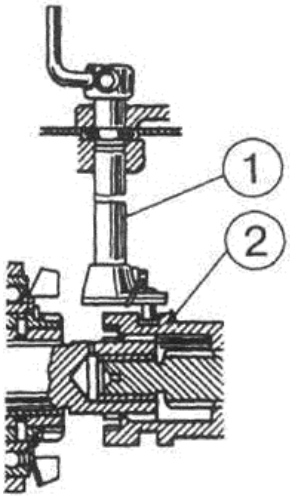



**Figure 4.121**

m) mount foot and parking-reserve brakes, differential imtelock clutch, see section **4.6** “Brakes”;
n)mount top cover of rear axle and secure it with bolts;
o) mount hubs for fastening rear wheels, and to do this:
1) mount hub 2 (Figure 4.122) on half-axle;
2) install inserts 3 and slightly tighten bolts 1;
3) one-by-one tightening bolts 1 of top and bottom inserts 3, put end faces of inserts in one plane;
4) finally torque bolts 1 to 500...600 N·m (50...60 kgf.l).

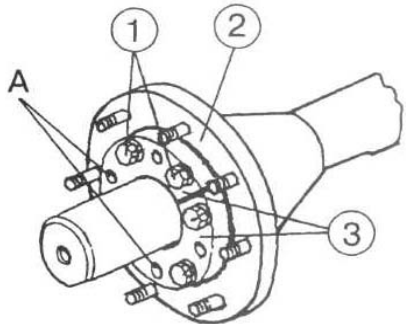



**Figure 4.122**

### 4.5.3 Adjusting rear axle

**Adjusting conical bearings of differential and engagement of main deive gears**

Make adjustment during assembly made after rear axle repair, as well as when axial clearance in differential bearings exceed 0.3 mm, or lateral clearance in the engagement of main drive gears is over 0.8 mm.

**Checking and adjusting tension of differential bearings**

a) bring indicator 1 (Figure 4.123) to driven gear crown 2 and moving differential body in axial direction with effort of 500...600 N (50...60 kgf) using mounting blade, gauge differential axial play;

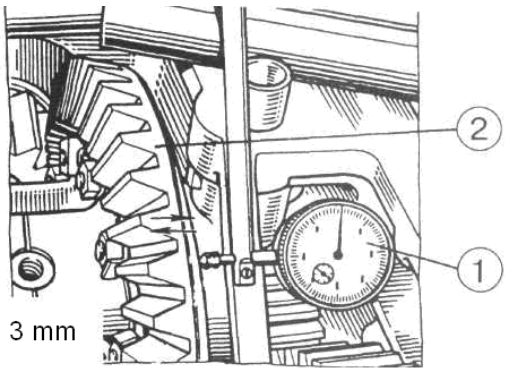



**Figure 4.123**

b) unscrew bolts for fastening cup 2 (Figure 4.124) and screwing them inside dismounting openinings in flange, press out the cup to extent allowing free dismantling of adjustment shims 4;

c) by reducing thickness of stack of spacers 4 under flange of left cup 2, obtain such tension of differential bearings, that effort applied to external end face of driven gear teeth of main drive in order to turn through differential in bearings was in the range of 3..5 kgf (30...50 N).

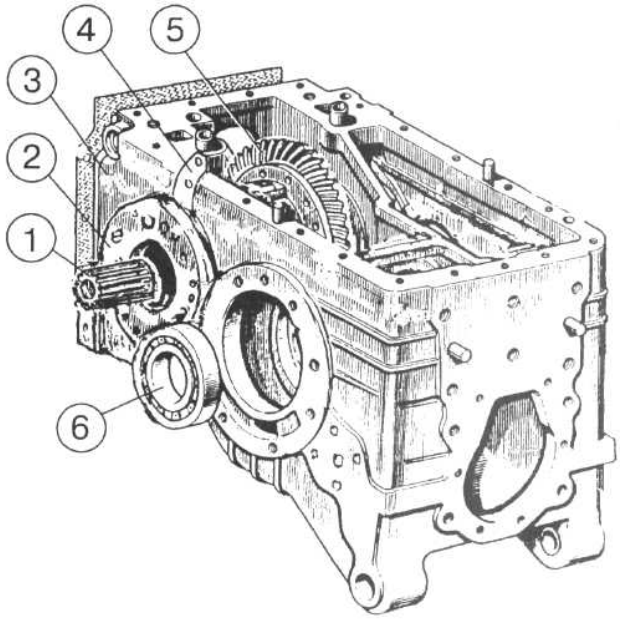



**Figure 4.124**

**Checking lateral clearance and tooth contact of engaged gears of main drive**

a) bring indicator 1 (Figure 4.125) to working surface of driven gear tooth 2 of differential;

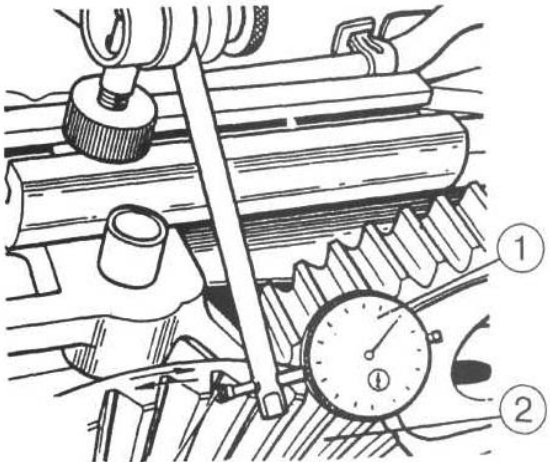
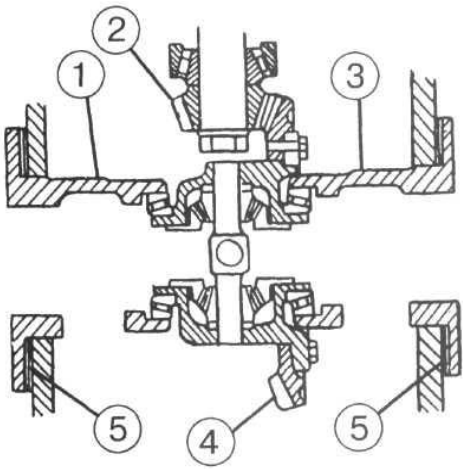



**Figure 4.125**

b) fix gear 2 (Figure 4.126) against turning through and, while swinging driven gear 4, measure lateral clearance in the engagement.

Measure clearance at least in three positions of driven gear 4 in every 120°.




1 – left-side cup; 2 – main drive gear; 3 – right-side cup; 4 – driven gear of main drive; 5 – adjustment shims.

**Figure 4.126**

| | | |
|---|---|---|
| Lateral clearance of engaged gears, mm | Initial dimensions | 0.25…0.55 |
| | Extreme value | 0.80 |

**If clearance in the engagement exceeds extreme value, make adjustment, and to do this:**

a) press out both cups to value allowing to remove adjustment shims 5 (Figure 4.126);

b) to reduce lateral clearance of engaged gears rearrange part of spacers from under flange of right-side cup 3 and put them under flange of left-side cup 1 without changing total number of spacers, and beaing in mind that diametrally opposite stacks of spacers should have the same thickness;

c) to increase lateral clearance rearrange part of spacers from left-side cup putting them under the right-side cup;

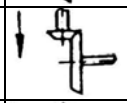
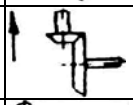
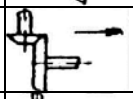
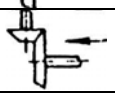
**ATTENTION!** Check lateral clearance of main pair engagement and tightness of differential bearings after all bolts for fastening cup with brakes' housings are tightened. Adjustment of lateral clearance of main pair engagement shall be carried out only after differential bearings have been adjusted.

d) put mixture of read lead and oil on several teeth in at least three sectors of gear ring , equally spaced along circumference of driven gear 4;

e) rotate driven gear by several turns and check tooth contact, which should be not less than 50% of working tooth area and be in its middle section or closer to cone summit;

If tooth contact doesn't correspond to the above-mentioned conditions, adjust engagement following recommendations given in table.

**Table 4.1**

| Position of tooth contact on driven gear | | The way to obtain correct engagement of gears | Diagram |
|---|---|---|---|
| Forward run | Back run | | |
|  |  | Correct gears' engagement when checking under small load |  |
|  |  | Move drive gear towards driven one |  |
|  |  | Move drive gear away from driven one |  |
|  |  | Move driven gear away from drive one |  |
|  |  | Move driven gear towards drive one |  |

**ATTENTION**! Replace worn out gears of main drive only in pair.

## 4.6 Brakes

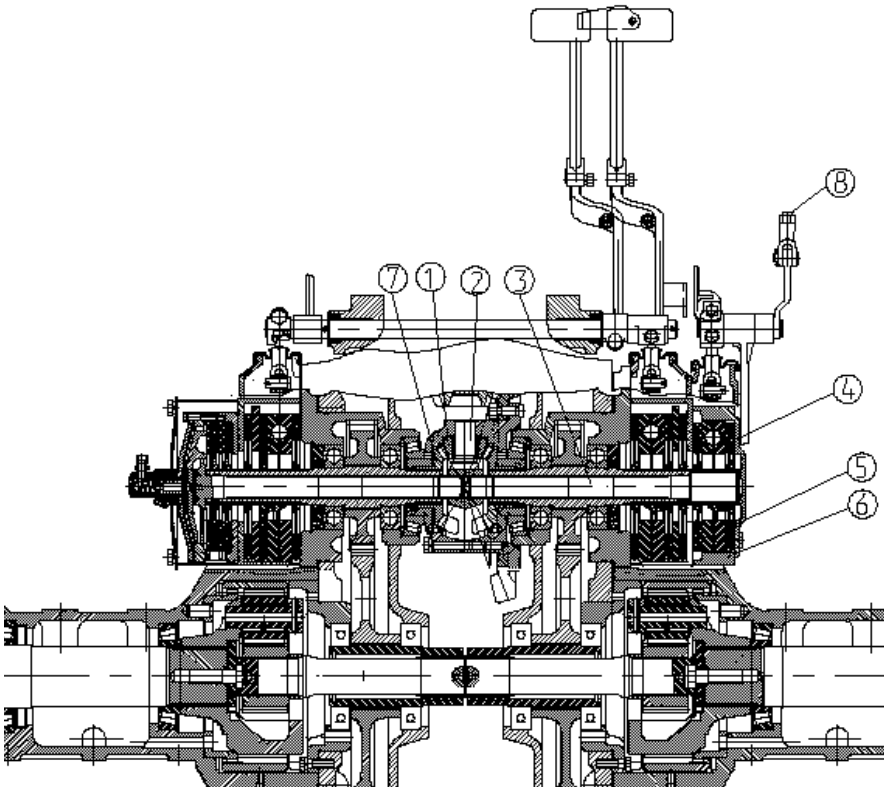
Tractors are equipped with foot-driven working brakes and separate parking stand-by brake with manually driven lever.

Left- and right-side foot brakes are engaged for simultaneous braking of both wheels with interlocked pedals, or separately for brake left or right wheel.

Separate braking is used in performing some works when enhanced tractor, or tractor aggregate manoevrability is required with minimum turning radii through inside wheel braking.

Parking brake is mounted on housing of right-side foot brake and is designed for keeping tractor in place during parking, it is allowed to use it for short time for braking tractor when foot brakes fail.

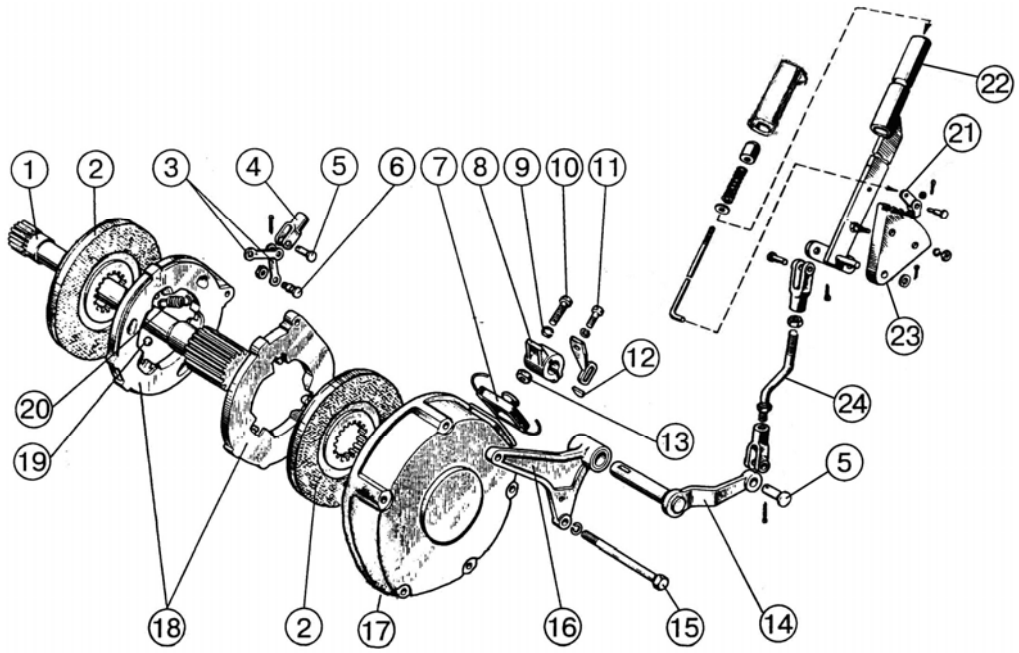
During tractor travel rotation from cross bar of differential (2), (figure 4.127), via shaft (3) is transferred to brake disks (5) of parking brake. When pulling brake lever, squeeze disks (4), turning relative each other, move apart and brake braking disks and shaft (3) connected to them and differential cross bar, interlocking via satellites (1) half-axle gears (7) of differential, side and final gears, and tractor wheels.




1 – satellite; 2 – differential cross bar; 3 – shaft of parking-stand-by brake; 4 – squeeze disks of parking brake; 5 – brake disks of parking brake; 6 – housing; 7 – half-axle gear, 8 – tie-rod for shifting parking brake.

**Figure 4.127**

### 4.6.1 Dismounting of parking and right-side foot brake as an assembly




1.- brake shaft; 2 – braking disk; 3 – tie-rod; 4 – yoke; 5 – pin; 6 – pin; 7 – sheath; 8 – lever; 9 – spherical washer; 10 - bolt-tie-rod; 11 – coupling bolt; 12 – key; 13 – check nut; 14 – roller with lever; 15 – fastening bolt; 16 - arm; 17 - sheath; 18 squeeze disks; 19 - ball; 20 – tightening spring; 21 – fixing element; 22 – lever; 23 – sector; 24 – tie-rod.

**Figure 4.128**

a) pull out pin 5 (Figure 4.128) and disconnect tie-rod 24 from lever 14;

b) unscrew adjustment bolt-tie-rod (10) of parking brake, having loosened check nut (13), remove spherical washer (9) and disconnect lever (8) from brake yoke (4;

c) unpin and unscrew adjustment bolt-tie-rod (5) (figure 4.130**)** of right-side foot brake, remove spherical washer (6) and disconnect lever of right-side pedal (3) of brake control from yoke of brake (20);

d) unscrew bolts (15) (figure 4.128) for fastening arm of shifting parking brake, sheathes of parking and right-side foot brakes;

e) remove arm (16) with roller and lever (14) as an assembly;

f) dismount parking and foot brakes as an assembly.

### 4.6.2 Disassembly of parking brake

a) remove sheathe 7 (Figure 4.128) from housing C3T 17;

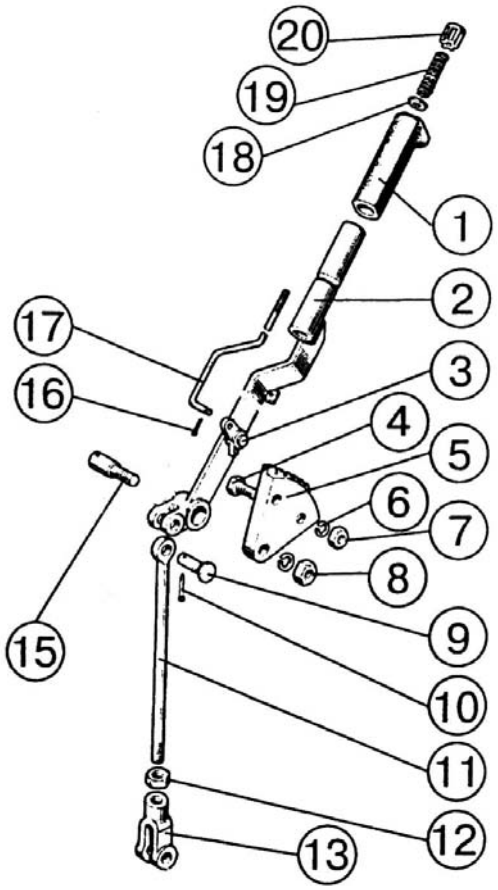
b) pull pressure disks (18) as an assembly and brake disks (2) out of housing;

c) remove three springs (20) from pressure disks (18), disconnect disks and pull three balls (19) out of profile grooves of disks (18);

d) ) unpin and remove pin (5), unscrew nuts of pins (6), remove pins, tie-rods (3) and yoke (4).

### 4.6.3 Disassembly of lever for parking brake control

a) remove lever 2 (Figure 4.129) as an assembly with tie-rod 11 from axle 15 by unscrewing nut 8;
b) remove sector (5) from cabin side plate, by unscrewing nuts (7);
c) loosen check nut 12 and unscrew yoke 13 from yie-rod 11;
d) disconnect tie-rod (11) from lever (2), to do this unpin and pull out pin (9)
e) unscrew button 20 off tie-rod 17, then pull out spring 19 and washer 18 of lever 2;
f) remove handle 1 from lever 2;
g) disconnect tie-rod 17 from fixing element 3, by pulling out cotter pin 16.

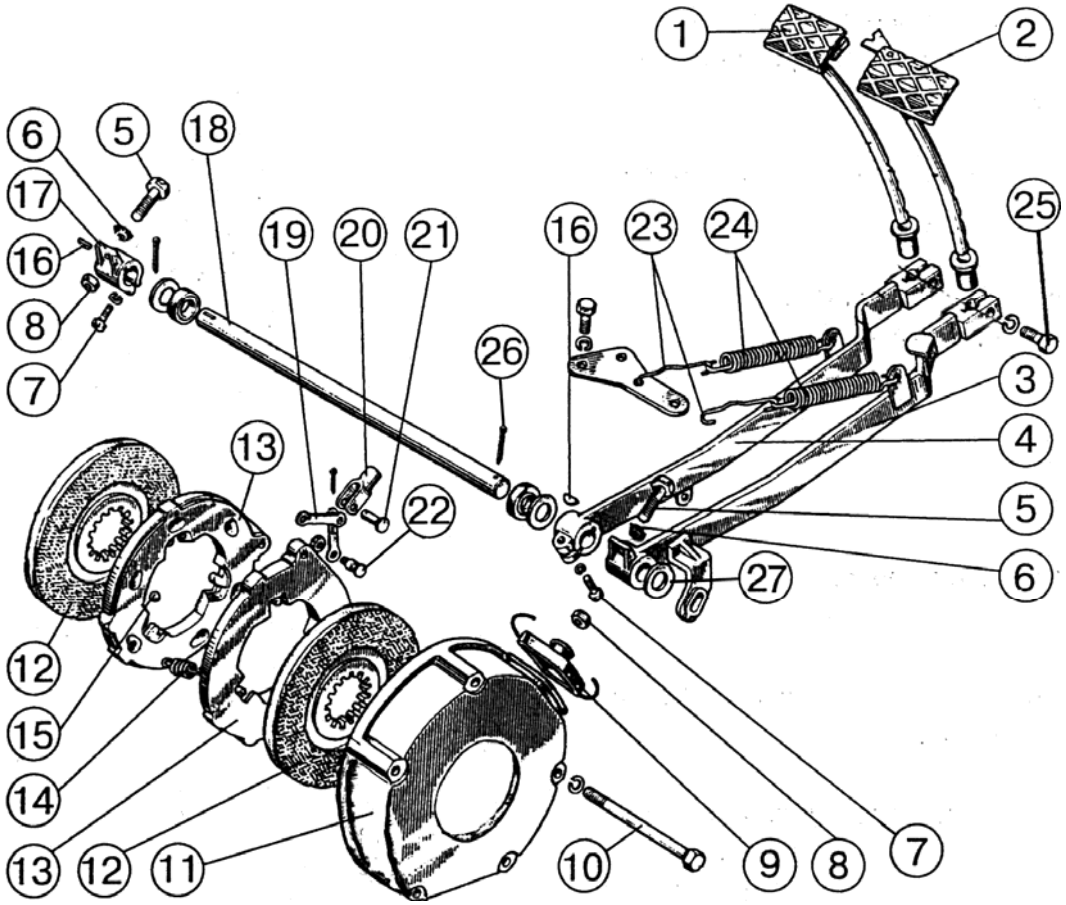



1 – handle; 2 – lever; 3 – fixing element; 4 – bolt; 5 – sector; 6 – washer; 7, 8 – nut; 9 – pin; 10, 16 – cotter pin; 11 – tie-rod; 12 – checknut; 13 – yoke; 15 – axle; 17 – tie-rod; 18 – washer; 19 – spring; 20 – button.

**Figure 4.129**

### 4.6.4 Dismounting of brakes' levers

a) unscrew bolts 25 (Figure 4.130) and remove pedals with rods 1, 2;
b) remove return springs 24 of brakes levers 3, 4, remove cotter pin 26 and washer 27 from roller 18, unscrew bolt 5, remove right-side lever 3, unscrew bolt 7 and remove left-side lever 4;
c) pull key 16 out of roller groove 18 and remove roller.

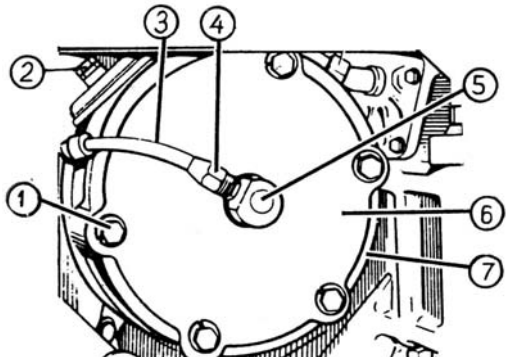



1 – pedal of left-side brake; 2 – pedal of right-side brake; 3 – right-side lever; 4 – left-side lever; 5 - bolt-tie-rod; 6 – spherical washer; 7 - bolt; 8 - checknut; 9 - sheath; 10 – housing bolt; 11 - housing; 12 – brake disk; - 13 – pressure disk; 14 – tightening spring; 15 – ball (5 pcs.);16 – key; 17 - lever; 18 – brake roller; 19 – tie-rod; 20 - yoke; 21 - pin; 22 - pin; 23 - extension; 24 - spring; 25 – clamp bolt; 26 –cotter pin; 27 – washer.

**Figure 4.130**

### 4.6.5 Dismounting of clutch of differential interlock (dry type)

a) unscrew cap nut 4 (Figure 4.131) and disconnect oil line 3 from adapter connecting pipe 5;
b) unscrew bolts fastening housing of differential interlock clutch and foot brake 1 and remove housing 6 of DI as an assembly with adapter 5;
c) remove interlock clutch as an assembly.

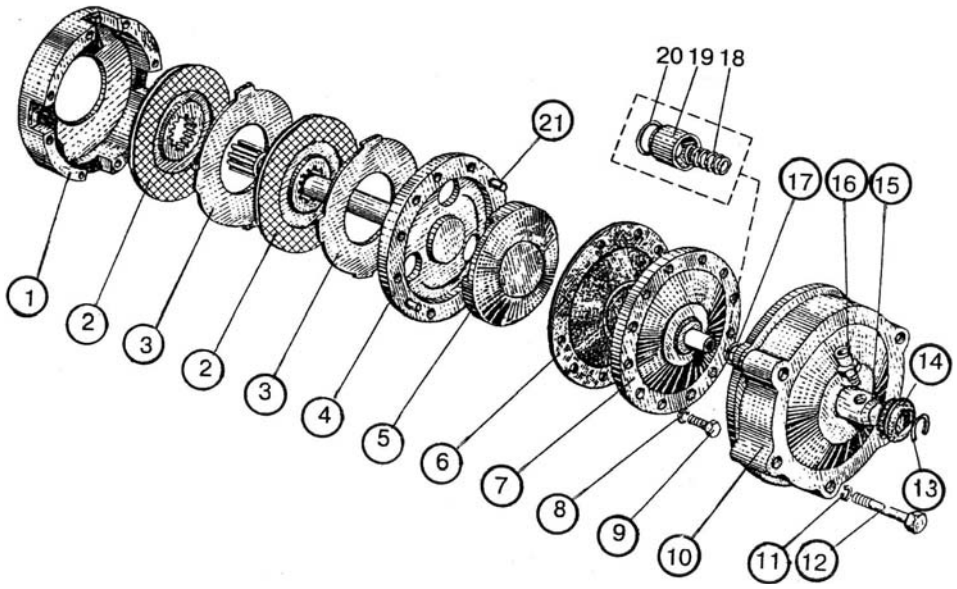



1 – fastening bolt; 2 – adjustment bolt; 3 – oil line of rear axle DI; 4 – cap nut; 5 – adapter; 6 – DI housing; 7 – housing of left-side brake.

**Figure 4.131**

### 4.6.6 Disassembly of differential interlock clutch

a) unscrew bolts 9 (Figure 4.132) and remove 7, diaphragm 6 and pressure disk 5;
b) remove shaft 4 and disks 2, 3;
c) unscrew connecting pipe 16 off adapter;
d) remove stop ring 13, sealant and adapter 15;
e) remove out of adapter the ring 17, bushing 19 with ring 20, spring 18;
f) remove ring 20 from bushing 19.




1 – clutch body; 2 – friction disk; 3 – squeeze disk; 4 – interlock shaft; 5 – pressure disk; 6 – diaphragm; 7 – diaphragm cover; 8 – washer; 9 – bolt; 10 – housing; 11 – washer; 12 – bolt; 13 – ring; 14 – sealant; 15 – adapter; 16 – connecting pipe; 17 – ring; 18 – spring; 19 – bushing; 20 – ring; 21 – pin.

**Figure 4.132**

**During subsequent assembly:**

a) disks 2 (Figure 4.132) must move along splines of interlock shaft (4) under its own weight;
b) disks' facia should have no traces of oil or grease;
c) bolts 9 must be torqued to 14…18 N•m.

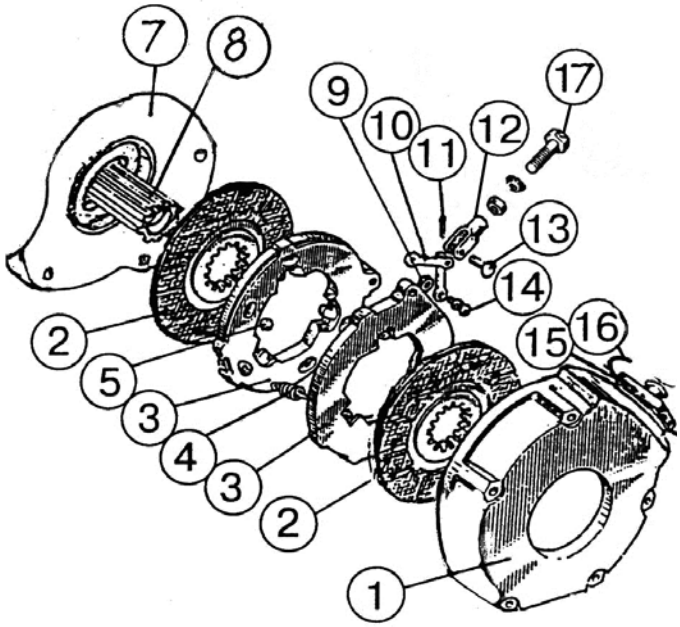
### 4.6.7 Dismounting of left-side foot brake

Unpin checknut and unscrew adjustment bolt-tie-rod 17 (Figure 4.133), remove spherical washer. Dismount left-side brake with housing as an assembly.

### 4.6.8 Disassembly of two-disk foot brake

**Note:** Disassembly of left-side and right-side foot brakes is identical.

a) unscrew bolt-tie-rod 17 (Figure 4.133);
b) remove sheath 15, by unpinning wire 16;
c) remove housing 1 as an assembly with brake, pull pressure 3 as an assembly and two brake disks 2 out of sheath;
d) remove three springs 4 from pressure disks 3, take them apart and pull five balls 5 out of profile grooves of disks 3)
e) unpin pin 13, unscrew nut 9 off pin 14, remove tie-rods 10 and yoke 12.




1 – housing; 2 – brake disk; 3 – pressure disk; 4 – spring; 5 – ball (5 pcs.); 7 – cup; 8 – shaft; 9 – nut; 10 – tie-rod; 11 – cotter pin; 12 – yoke; 13 – pin; 14 – pin; 15 – sheath; 16 – wire; 17 – adjustment bolt-tie-rod.

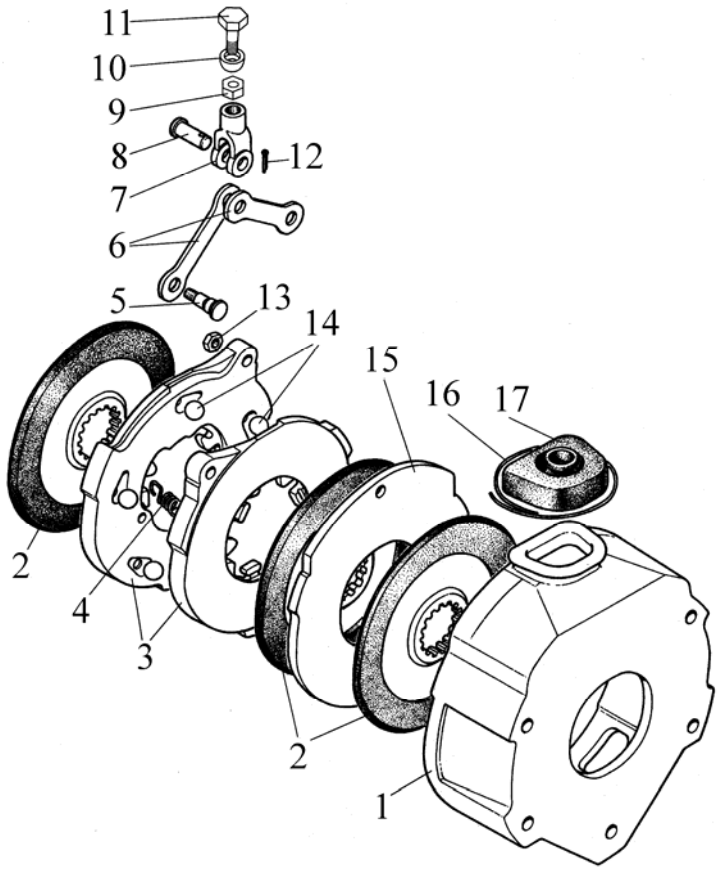
**Figure 4.133**

**Assembly of right-side two-disk brake (dry)**

a) put thin coating of grease LITOL-24 on surface of profile grooves of disks 3 (Figure 4.133), put five balls inside them 5;
b) mount second pressure disk 3 with grooves on balls and tighten them with springs 4;
c) mount tie-rods 10, naving connected them with disks 3 by means of pins 14, and with yoke 12 – by means of pin 13;
d) secure pins 14 with nuts 9, and pin 13 – with cotter pin 11;
e) put on housing 1 sheath 15 and fix it on housing neck 1 with safety wire 16;
f) wipe with cloth working surfaces of housing 1, brake disks 2, pressure disks 3, and place them inside housing, put sheath 15 on yoke 12;
g) pull yoke 12, while watching movement of pressure disks 3. With no effort exerted on yoke disks must return to initial position under action of tightening springs 4;
h) put brake disk 2 on shaft splines 8 of side gear, then housing 1 as an assembly with brake disks

**4.6.9 Disassembly of right-side three-disk brake**

a) loosen check nut 9 (Figure 4.134) and unscrew bolt 11;
b) remove spherical washer 10;
c) take off safety wire 16 and sheath 17;
d) remove housing (1) as an assembly with disks, having first dismounted parking brake on the right side, or differential interlock clutch on the left side;
e) dismount pressure disks as an assembly 3, three brake disks 2 and intermediate disk 15;
f) take off three tightening springs 4, take apart pressure disks 3 and pull five balls 14 out of profile groove;
g) take off cotter pin 12 and pull out pin 8;
h) dismount yoke 7;
i) unscrew nuts 13 and dismount tie-rods 6.




1 – housing; 2 – brake disk; 3 – pressure disk; 4 – tightening spring; 5 – pin; 6 – tie-rod; 7 – yoke; 8 – pin; 9 – checknut; 10 – spherical washer; 11 – adjustment bolt; 12 – cotter pin; 13 – nut; 14 – steel ball (5 pcs.); 15 – intermediate диск; 16 - wire; 17 – sheath

**Figure 4.134**

### 4.6.10 Assembly of right-side three-disk brake (dry type)

a) assembly pressure disks 3 (Figure 4.134), and to do this:

1) put thin coating of grease LITOL-24 on surface of profile grooves, put five balls 14, and install second pressure disk, tighten disks with springs 4;

2) install tie-rods 6, having connected them with disks 3 using pins 5, and with yoke 7 – using pin 8;

3) pull yoke 7, watching movement of pressure disks 3;

4) after yoke affecting is stopped, disks must return to initial position under action of tightening springs;

5) install pins 5 and 8, tie-rods 6 and yoke 7;

6) surfaces of disks', cup and housing friction must be clean and dry;

7) place the first brake disk, intermediate disk, the second brake disk and pressure disks as an assembly inside housing 1. Put the third brake disk, as well as the first and the second brake disks on splines of shaft of final gear driving gear.

### 4.6.11 Assembly of left-side foot brake and differential interlock clutch

a) make assembly and installation of the left-side brake in a way similar to assembly and installation of the right-side foot brake;

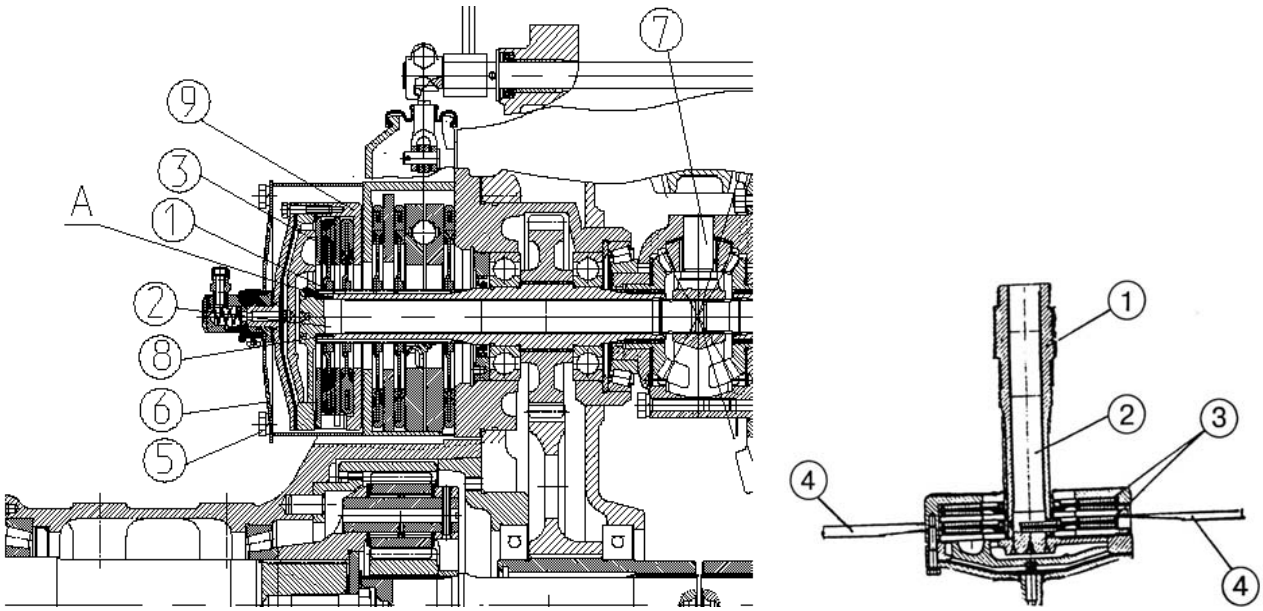
b) align, using shaft 1 of final drive driving gear, disks 3, interlock clutches and secure them with two diametrally located riveted rods 4 (screwdriver type);

c) pull shaft 1 out of splined section of clutch friction disks;

d) grease with consistent lubricant mounting faces "**A**" of interlock shaft 2 and rings 8 inside opening of shaft 1 of the final drive gear;

e) install assembled friction clutch in a way to align splines of shaft 2 and differential crossbar 7, as well as splines of friction disks 3 and shaft 1 of final drive gear In case of splines' misalignment repeat operations 2…5;

f) mount housing 9 and secure it with bolts 5.




1 – drive gear shaft; 2 – interlock shaft; 3 – clutch disks; 4 – rod; 5 – bolt; 6 – housing; 7 – differential crossbar; 8 – sealing ring; 9 – clutch housing

**Figure 4.135**

### 4.6.12 Assembly of parking brake

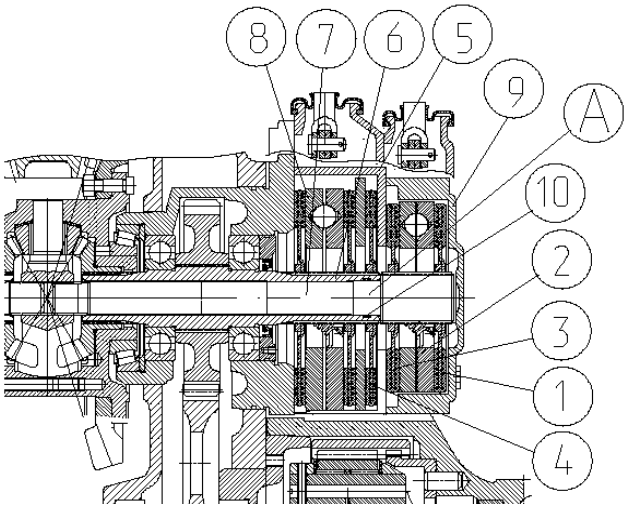
a) make subassembly of the parking brake similarly to assembly of two-disk foot brakes.

**Attention!** Size of brake disks (1), (3), pressure disks (2) parking brake disks and housing 9 is smaller than that of foot brakes. Outside diameter of brake disks 1 parking brake – 180 mm, of main brakes 4 – 204 mm (Figure 4.136).

Thickness of parking brake disk – 12.2 mm, foot brakes' disk – 10.5 mm.

b) mount brake shaft 7, having first lubricated with consistent grease its mounting neck "**A**" and sealing rings 10 of shaft 6;

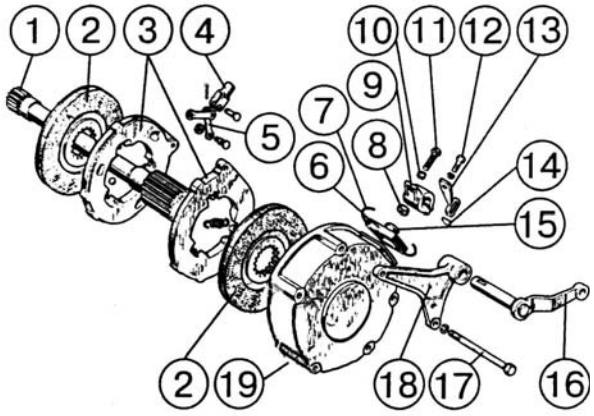
c) mount on splines of shaft 7 brake disk 3, and then subassembled set "Housing with disks (item 1)";




1 – external brake disk of parking brake; 2 – pressure disks; 3 – internal brake disk of parking brake; 4 – foot brake braking disks; 5 – foot brake housing; 6 – drive shaft; 7 – parking brake shaft; 8 – pressure disks of foot brakes; 9 – parking brake housing; 10 – ring

**Figure 4.136**

d) install arm 18 (Figure 4.137) with levers 16, 9 and secure with bolts 17; before mounting lever 16 lubricate lever axle with consistent grease.

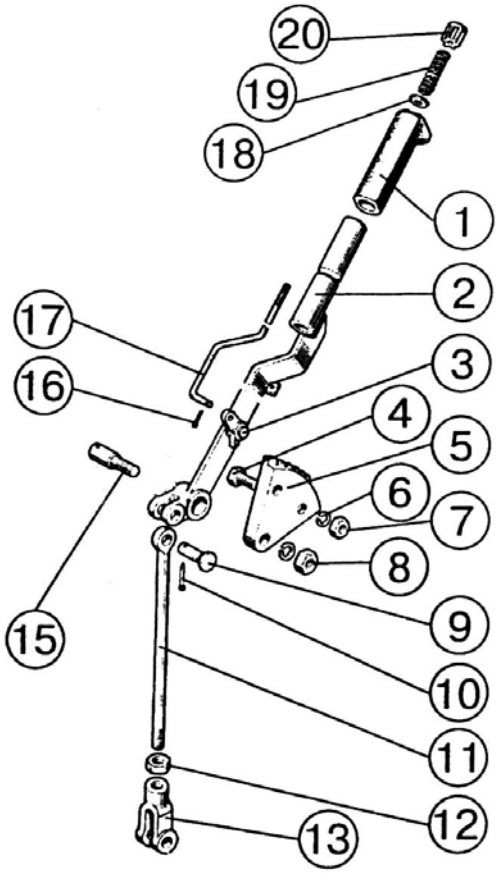



1 – brake shaft; 2 – brake disk; 3 – pressure disks; 4 –yoke; 5 – tie-rod; 6 – sheath; 7 – wire; 8 – checknut; 9 – brake lever; 10 – spherical nut; 11 – bolt; 12 – bolt; 13 – lever; 14 – key; 15 – ring; 16 – lever as an assembly; 17 – bolt; 18 – arm; 19 – housing.

**Figure 4.137**

### 4.6.13 Assembly of parking brake control lever

a) press handle 1 on lever 2 (Figure 4.138);
b) insert tie-rod 17 inside lever handle 2, connect it to fixing element 3 and fix with cotter pinом 16;
c) from upper end insert inside handle 1 of lever 2 washer 18, spring 19, press tie-rod 17 from below, and screw button 20 on it;
d) install sector 5, once it was dismounted, on cabin side plate, secure it with bolts 4 and mount on it on axle 15 lever 2 as an assembly with tie-rod 17;




1 – handle; 2 – lever; 3 – fixing element; 4 – bolt; 5 – sector; 6 – washer; 7, 8 – nut; 9 – pin; 10, 16 – cotter-pin; 11, – tie-rod; 12 – checknut; 13 – yoke; 15 – axle; 17 – tie-rod; 18 – washer; 19 – spring; 20 – button.

**Figure 4.138**

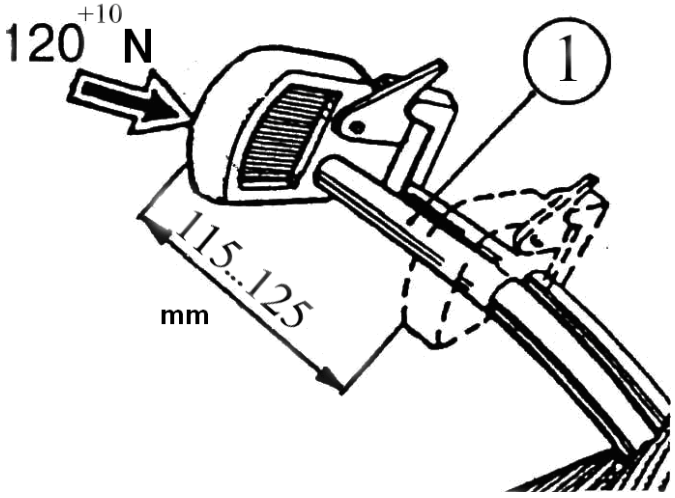
e) connect tie-rod 4 (Figure 4.139) with lever 7 by means of pin 6;
f) put lever 1 to extreme bottom position, loosen checknut 5, unpin and remove pin 6;
g) by screwing up or unscrewing yoke of tie-rod 4, set length of tie-rod to align top edge of groove "**A**" on the right-side lever of foot brake with top edge of groove "**A**" of lever 9;
h) lock yoke with checknut 5;

i) adjust control of parking brake, see section **4.6.15** “Adjustment of parking brake, brake valve and regulator of pneumatic system pressure”;

1 – handle; 2 – sector; 3 – fixing element; 4 – tie-rod; 5 – checknut; 6 – pin;7,9 – lever; 8 - bolt

**Figure 4.139**

**4.6.14 Adjustment of foot brake, valve and regulator of pneumatic system pressure**

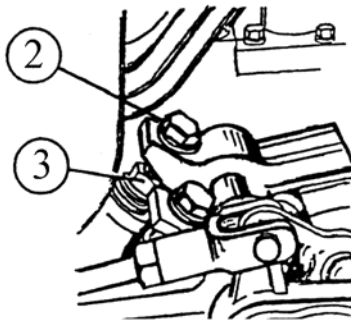



1 – pedal of right-side foot brake

**Figure 4.140**

Make adjustment of brakes control in the following way:

a) unscrew check nuts 3 (Figure 4.141) of adjustment bolts 2 of right-side and left-side foot brakes;




2 – adjustment bolt; 3 – checknut

**Figure 4.141**

b) screw bolts 2 inside adjustment yokes or unscrew them to an extent that full travel of brakes' right-side pedal was in the range of 115…125 mm upon effort 120…130 N, and braking distance was no more than 6 m at speed of 20 km/hour with effort no more than 600 N on pedals interlocked with bar, and also non-simultaneity of wheels braking start no more than 1 m (by impression). Travel of left-side brake pedal must be 5…20 mm shorter than travel of the right-side brake pedal in order to provide simultaneous actuation of brakes in the interlocked position. Reduction of brakes' pedals' travel to less than above-mentioned values is not permitted, as this leads to premature wear of facia and overheating of brakes.

c) tighten check nuts 3.

Ingress of grease inside dry friction brake causes oiling of disks, reduction of friction force between their working surfaces, brakes "don't hold". In this case disassembly the brake, eliminate oil leakage, wash oily disks with benzene and let them dry up for 5…8 min. After assembly adjust brakes control.

**4.6.15 Adjustment of parking brake, brake valve and regulator of pneumatic system pressure**

Put tractor on even terrain, shut down the diesel, lock rear axle from front and back, and perform the following operations:

a) shift lever of parking brake control 1 (Figure 4.142) to front position (push);

b) loosen checknut of adjustment bolt 8 (Figure 4.143), and check nut 7 and pull out pin 5;

c) shift lever 4 and align top edge of groove "**$B_1$**" of lever 2 with top edge of groove "**$B_2$**" of lever 3 of the brake right-side pedal, and then, rotating yoke 6, align openings of lever 4 and yokes 6 and insert pin 5;

d) unscrew or screw bolt (8) so that when pulling control lever with effort $200^{+10}$ N the latch was retained inside hollow of the third and fourth teeth of sector "**A**". After adjustment tightened loosened checknuts.

Make final check and adjustment of the parking brake on the assembled tractor. Tractor must be retained on grade not less than 18% when to parking brake lever (1) effort no more than 400 N is applied. Where necessary, correct adjustment using adjustment bolt 8.

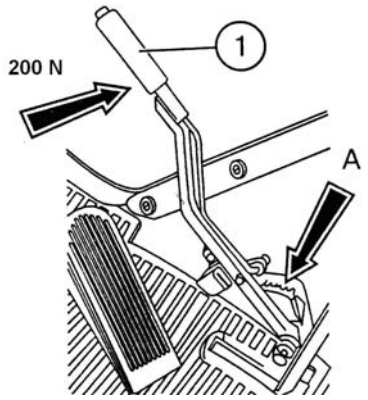
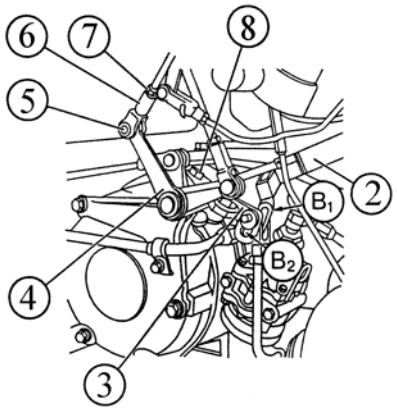



**Figure 4.142**

**Note.** For tractors equipped (optional) with multi-disk brakes, that operate in oil bath, operations of adjusting foot brakes and parking brakes are identical to described above for tractors with dry type brakes.




1 – lever for parking brake control; 2 – lever; 3 – lever; 4 – lever; 5 – pin; 6 – yoke; 7 – checknut; 8 – adjustment bolt

**Figure 4.143**

### 4.6.16 Multi-disk foot and parking brakes operating in oil bath

In order to enhance efficiency, reliability and service life of tractor brakes the tractors of series “1000” are equipped with multi-disk brakes operating in oil bath (“wet” brakes). Clutch of rear axle differential interlock is mounted inside brake body, and has oil bath common with it, so it is also made in “wet” version. Design of brake (Figure 4.144).

**Foot brakes –** eight-disk. Friction disks (2) are installed on spline ends of drive gears of final drives (16). In design pressure disks (6) are similar to those used in dry brakes, except for smaller angle of balls’ hollows to provide necessary effort for compression of stacks of friction and intermediate disks.

.

**Attention!** Pressure disks of dry and “wet” brakes have identical overall and mounting dimensions, but they are not interchangeable. It is strictly forbidden to install disks of dry brakes on “wet” brakes, and visa versa, as it affects safety of tractors operation

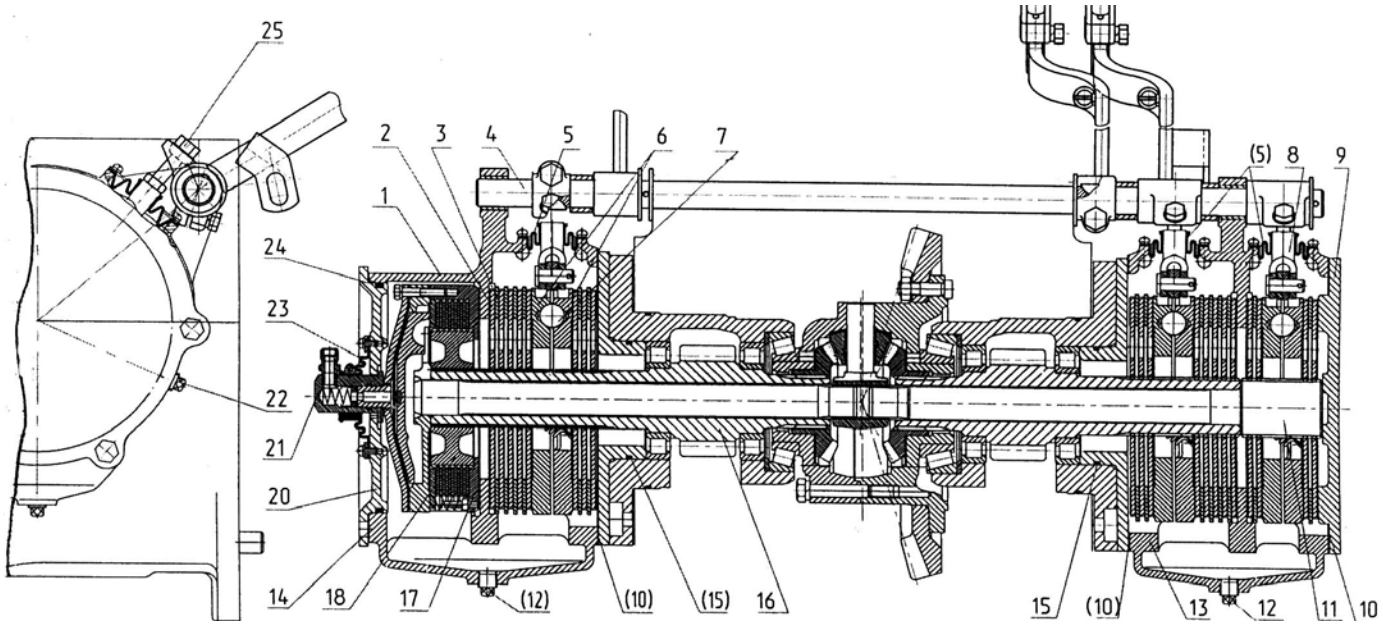
Intermediate disks 3 are secured against turning through in bodies 1, 13 by means of shoulders, made on the external contour. Air tightness of oil baths is provided by means of sealing rings, 15, 24, spacers 10, 14 and rubber sheaths 5, 23. Bodies are provided with check plugs 22 and drain plugs 12.

On tractors of series “1000” “wet” 4-disk **parking brake** is installed 8, made in common body with foot brake. Parts of parking brake are unitized with foot brakes’ parts.

### 4.6.17 Control of brakes

The drive of foot brakes for tractors of series “1000” is mechanical by of levers and pedals. Parking brake is steered mechanically.

Drives for control of foot brakes and **“wet**” type parking brake don’t principally differ from those used in dry brakes of the corresponding model of tractor.




1 – brake body; 2 – friction disk; 3 – intermediate disk; 4 – roller of pedals; 5 – sealing sheath; 6 – pressure disk; 7 – ball; 8 – parking brake; 9 – cover; 10 - spacer; 11 – parking brake shaft; 12 – drain plug; 13 – brake body; 14 – spacer; 15 – sealing ring; 16 – drive gear of final drive; 17 – interlock clutch; 18 – hub; 20 – cover; 21 – adapter; 22 – check (fill in) plug; 23 – sealing sheath; 24 – sealing ring; 25 – adjustment bolt

**Figure 4.144**

### 4.6.18 Disassembly of left-side multi-disk brake operating in oil bath

a) put tractor on even horizontal terrain and block wheels with wedges from front and rear sides to exclude accidental tractor movement;

b) jack up left rear section of tractor until the wheel is lifted from support ground, and put secure support under the left-side sleeve of rear axle;

c) dismantle left-side rear wheel;

d) unscrew check filler plug 22 (Figure 4.145) and drain plug 10;

e) drain oil from body 1;

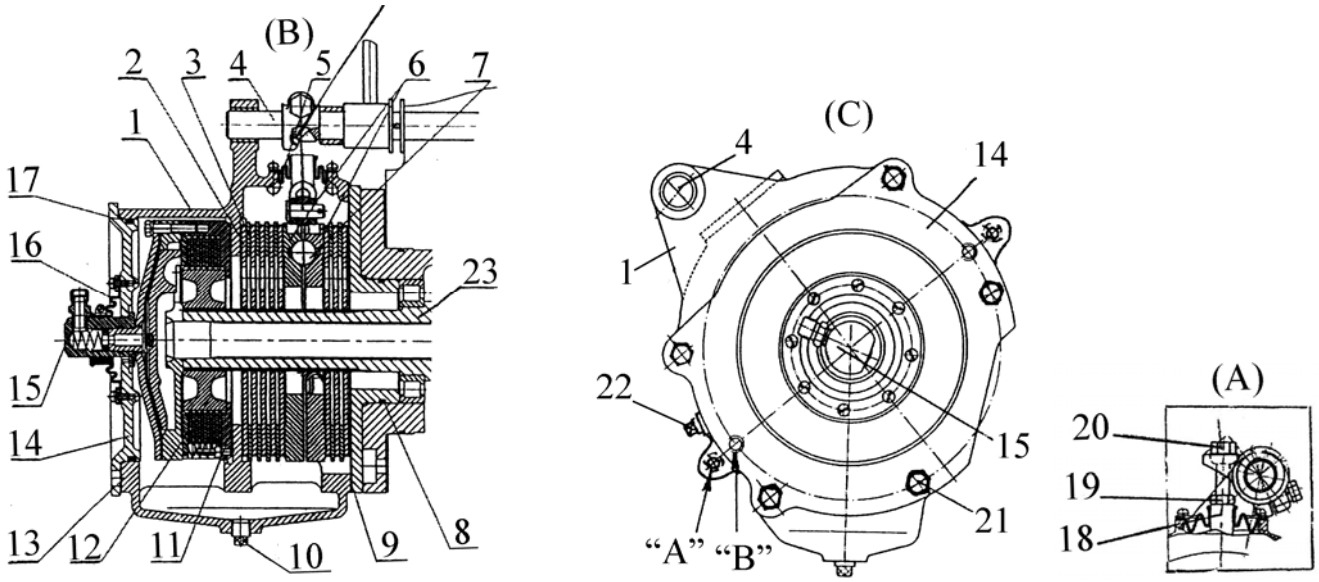
f) unscrew cap nut of DI oil line (not shown) and disconnect oil line from adapter 15;

g) unscrew five bolts 21 fastening brake body 1 and cover 14;

h) remove cover 14 with adapter 15 as an assembly, having screwed two bolts in disassembly openings "**B**";

j) dismount interlock clutch as an assembly (11), make clutch disassembly-assembly in a way similar to clutch disassembly-assembly of dry friction interlock (see section **4.6.6** "Disassembly-assembly of differential interlock clutch");

i) loosen checknut 19, unscrew adjustment bolt 20 from yoke 18;




1 – brake body; 2 – friction disk; 3 – intermediate disk; 4 – pedals' roller; 5 –sealing sheath; 6 – pressure disk; 7 – ball; 8 – sealing ring; 9 – spacer;10 – drain plug; 11 – DI clutch;12 – hub; 13 – spacer; 14 – cover; 15 – adapter; 16 - sheath; 17 – sealing ring;18 – yoke; 19 – checknut; 20 – adjustment bolt; 21 – bolt; 22 – check-filler plug; 23 – dive gear of final drive (left-side).

**"A"** Disassembly opening of body

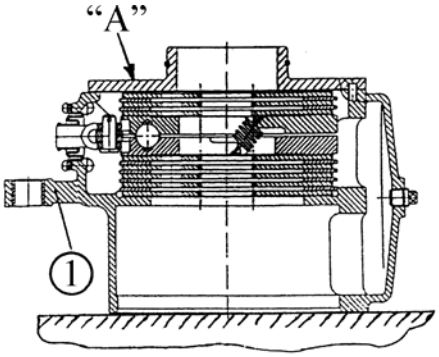
**"B"** Disassembly opening of cover

**Figure 4.145**

i) dismount body (1) with foot brake as an assembly, having screwed two bolts in disassembly threaded openings "**A**" of brake body;

k) remove body from mounting pins and pedals' roller 4;

l) put body with brake as an assembly 1 on the bench, see (Figure 4.146), (with cup cover "**A**" upwards);




1 – brake cover. "**A**". Cup cover

**Figure 4.146**

m) ) disassembly brake (Figure 4.147), by performing the following operations:

1) unscrew three screws 20 and disconnect cup cover 15 from body 1, remove spacer 13;

2) take off upper stack of disks, comprising three brakes 5 and two intermediate disks 6;

3) pull out pressure disks as an assembly 18, if necessary, unscrew four screws 8 and remove plate 12 and sheath 10;

4) remove lower stack of disks (on the side of body 1, comprising five brake disks 5 and four intermediate disks 6;

5) remove three springs from pressure disks 18;

6) unpin pin 7, unscrew nut 2, remove pins 3, 7 and yoke 11;

7) disconnect pressure disks and pull five balls 17 out of profile disks' grooves.

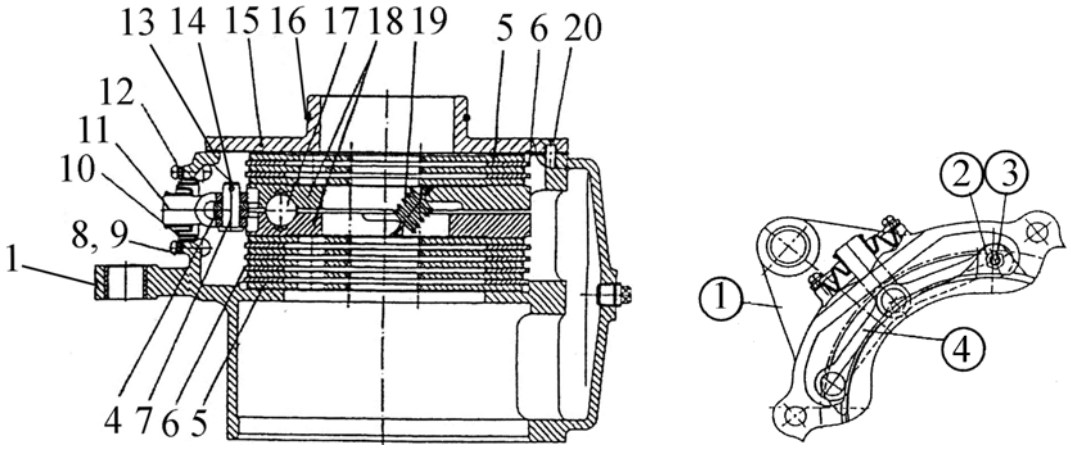



**Figure 4.147**

1 – body; 2 – nut; 3 – pin; 4 – tie-rod; 5 – brake disk (8 pcs.); 6 – intermediate disk (6 pcs.); 7 – pin; 8 – screw; 9 – washer; 10 – sheath; 11 – screw; 12 – plate; 13 – spacer; 14 – cotter pin; 15 – cup cover; 16 – ring 104x110; 17 – ball 22.225 mm (5 pcs.); 18 – pressure disk (2 pcs.); 19 – spring (3 pcs.); 20 – screw (3 pcs.); 21 – plug

### 4.6.19 Assembly of left-side brake

a) make assembly of brake in order reverse to disassembly, observing the following recommendations:

1) before installing cup cover 15 (Figure 4.147) check recession of upper surface «**A**» (Figure 4.148) of brake disk 5 in relation to surface «**B**» of body 1, which must be within 0.50…0.70 mm;

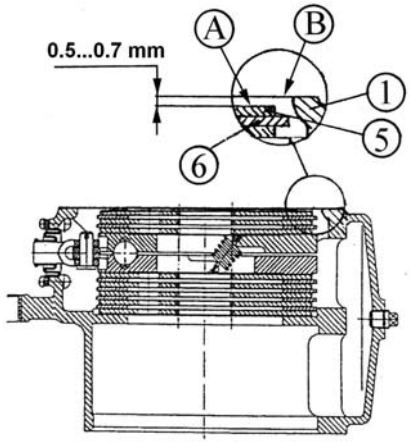



**Figure 4.148**

2) if value of recession (clearance) goes beyond the range, adjust it by selection and installation of intermediate disk (6) of required thickness. Serial number of disk labeling is imprinted on projection (support) of disk, as shown in **(figure 4.146)**. Serial numbers and thicknesses «**S**» corresponding to them are given in table below;

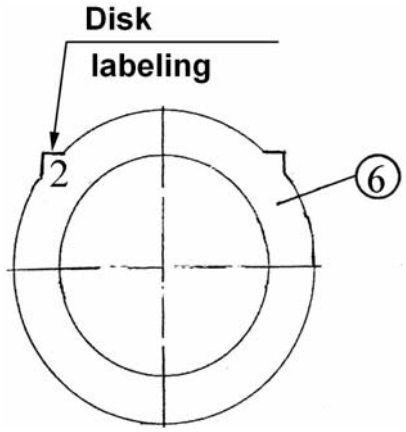



**Figure 4.149**

| Number | Thickness S, mm |
|---|---|
| Without number | $3.0_{-0.1}$ |
| 1 | $3.2_{-0.12}$ |
| 2 | $3.4_{-0.12}$ |
| 3 | 3.6-0.12 |
| 4 | 3.8-0.12 |
| 5 | 4.0-0.12 |
| 6 | 4.2-0.12 |
| 7 | 4.4-0.12 |

3) visually check quality of spacer 13 (Figure 4.150) and if damaged, install new poronyte 1 mm thick spacer;

4) install cup cover 15 and secure it with three screws 20;

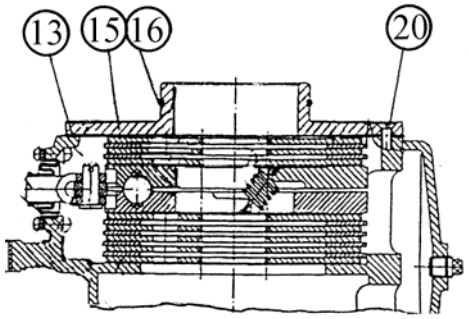



**Figure 4.150**

5) put sealing ring 16 and lubricate it with consistent grease to make mounting inside cup opening easier;

6) before mounting brake as an assembly on the tractor, align eight brake disks 5 (Figure 4.151) by means of special mandrel «**A**», having splined section matching slot openings of brake disks For mandrel sketch see (Figure 4.152).

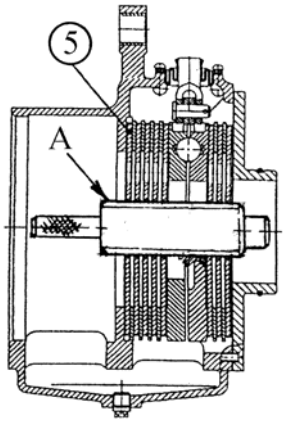
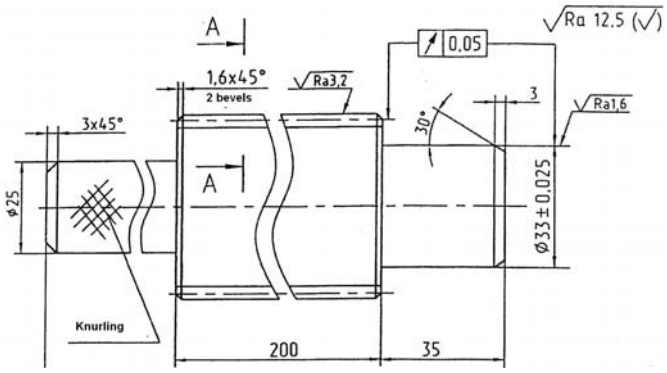


**Figure 4.151**




**A-A (2:1)**

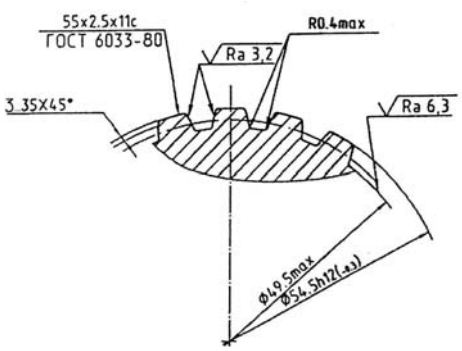


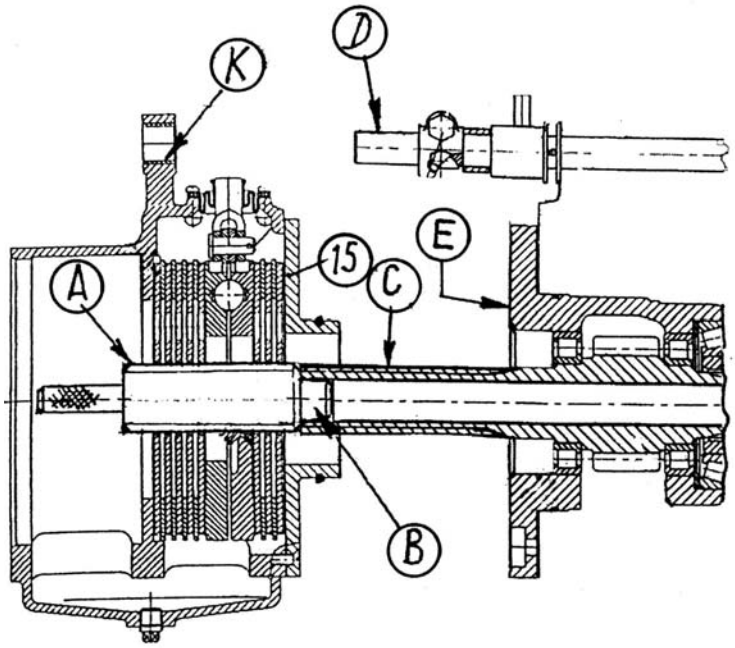

**Figure 4.152**

Adapter for assembly and installation of brake

| Spline parameters | | |
|---|---|---|
| Module | m | 2.5 |
| Number of teeth | z | 20 |
| Angle of initial contour profile | a | $30^0$ |
| Misalignment of initial contour | Xm | +1.125 |
| Roller diameter | Dm | 5,5 |
| Roller size | $M_a$ | $61.157\ ^{-0,160}_{-0,284}$ |
| Tooth thickness along arc of pitch line | S | 5.226 |
| Dividing diameter | d | 50 |

Material - steel
Hardness – 255-302 HB

7) mount brake (Figure 4.153) on tractor by performing the following operations:
7.1 bring brake together with aligning mandrel "**A**" to the end face of shank of final drive gear '**C**";
7.2) ) insert shank of mandrel "**B**" inside opening to the end;
7.3) turn brake with mandrel in a way to align splines of mandrel and gear;
7.4) smoothly and with some effort move brake off the mandrel and mount it on final drive gear, to match roller of pedals "**D**" with opening in brake body "**K**" and mounting of cover (15) to cup "**E**" to the end;




15 – cup cover; "**A**". Mandrel; "**B**". Mandrel shank; "**C**". Left-side gear of final drive; "**D**". Pedals' roller; "**E**". Cup; "**K**". Bushing body.

**Figure 4.153**

8) mount DI clutch 11, (Figure 4.145), cover (14) and adjustment bolt (20); make sure adapter doesn't jam (15) by turning it to small angle to the left and right 9) заправьте корпус тормоза трансмиссионным маслом до уровня контрольно-заливной пробки 22 (Figure 4.145);
10) make sure there is no oil leaks along brake body connections;
11) torque bolts for brake fastening 21 (Figure 4.145) 120…160 N мм;
b) adjust left-side brake with bolt 20 (Figure 4.145) to provide full travel of left-side pedal within 110…115 mm upon pressure with effort 250…300 N;
c) mount left-side rear wheel, torque bolts for disk fastening to 200…250 N•m. and take tractor off support.

### 4.6.20 Disassembly of right-side foot brake

a) make necessary preparatory operations described in section **4.6.20** “Disassembly of left-side multi-disk foot brake operating in oil bath”;

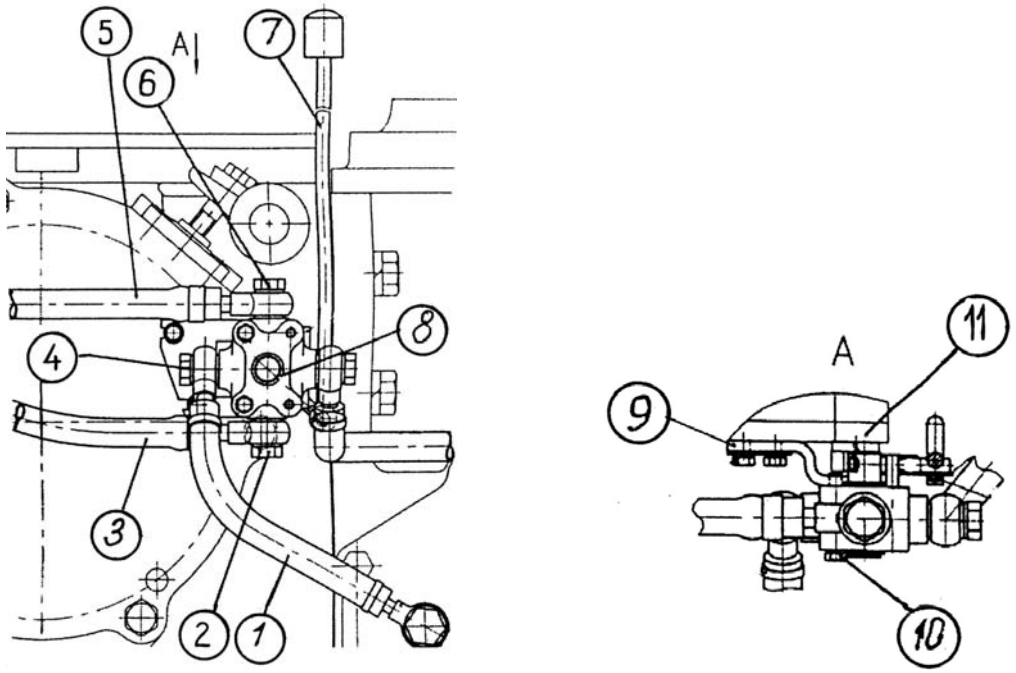
b) for tractors BELARUS-1221.2/1221.3 with hydromechanical drive of rear PTO (Figure 4.154 a, c) make the following operations:

1) disconnect tie-rod of rear PTO control 7 from lever of control valve 8;

2) unscrew bolts of reversing triangles 2, 4, 6 and disconnect oil lines 1, 3, 5 correspondigly off control valve;

3) unscrew two bolts 10 and disconnect contrpl valve from arm 9;

4) take valve aside from foot brake zone for next disassembly of brake cover 11 and body;

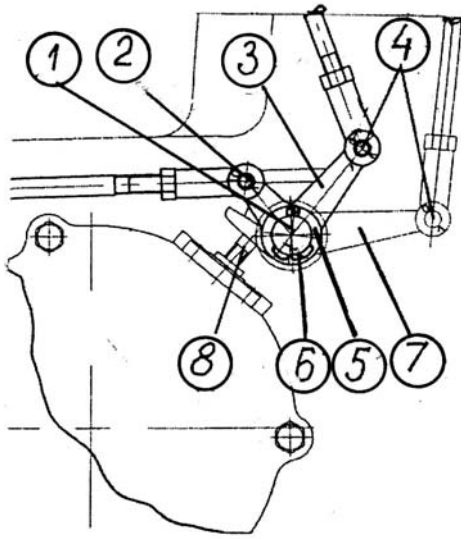



**(c)** **(a)**

1,3,5 – oil line; 2,4,6 – bolt of reversing triangle; 7 – control tie rod; 8 – control valve; 9 – arm; 10 – bolt; 11 – cover

**Figure 4.154**

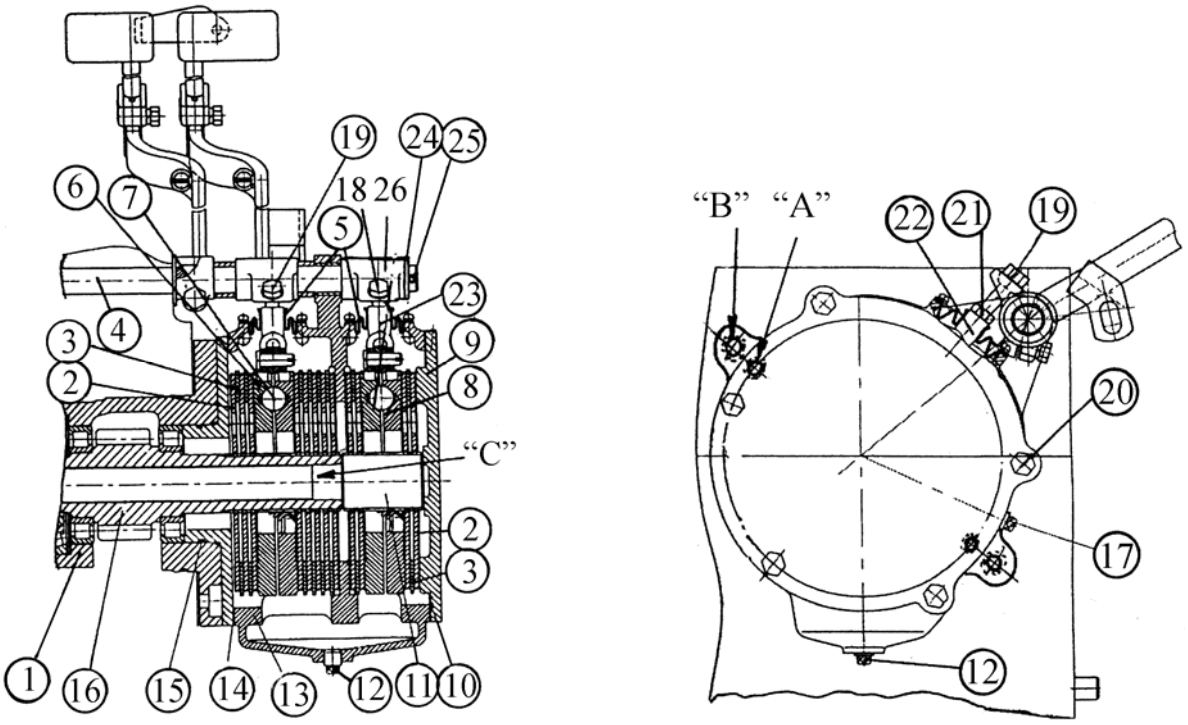
c) for tractors Belarus of series “1000” with mechanical drive of rear PTO (Figure 4.155):




1 – pedals roller; 2,4 – pin; 3 – PTO lever; 5 – washer; 6 – cotter pin; 7 – parking brake lever ; 8 – adjustment bolt of parking brake

**Figure 4.155**

1) remove cotter pin 6 and washer 5 from pedals' roller (1);
2) unpin and remove pins 2, 4 and disconnect control tie-rods from levers 3, 7;
3) dismount lever 3;
4) dismount lever 7, having unscrewed adjustment bolt of parking brake 8;
5) unscrew five bolts 20 (Figure 4.156) that fasten body of brake 13 and cover 9;
6) screw disassembly bolt in threaded openings "**A**" of cover 9 and remove cover;
7) remove external stack of disks 2, 3 on the side of removed cover (3 pcs.);




1 – cup; 2 – friction disk; 3 – intermediate disk; 4 – pedals' roller; 5 – sealing sheath; 6 – pressure disk; 7 – ball; 8 – parking brake; 9 – cover; 10 –spacer; 11 – parking brake shaft; 12 – drain plug; 13 – brake body; 14 – spacer; 15 – sealing ring; 16 – final drive gear; 17 – check plug (filler); 18 – adjustment bolt of parking brake; 19 – adjustment bolt of right-side foot brake; 20 – bolt; 21 - checkpnut; 22, 23 – yoke; 24 – washer; 25 – cotter pin; 26 - lever

**Figure 4.156**

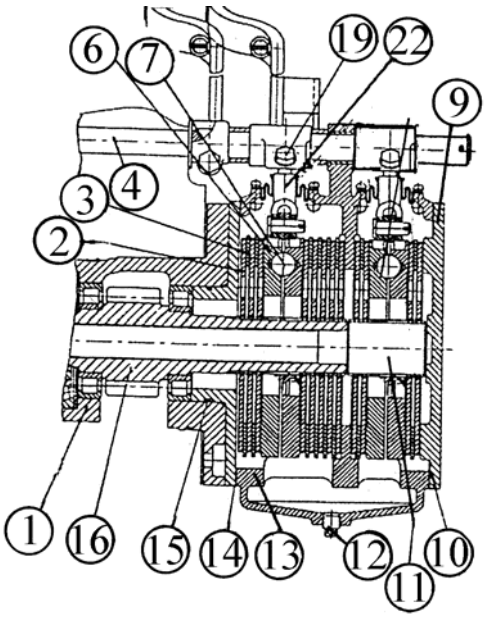
8) loosen checknut and unscrew adjustment bolt 18 off parking brake yoke 23;

9) dismount pressure disks of parking brake as an assembly (8) and internal stack of disks (3 pcs.);

10) dismount parking brake shaft 11;

11) remove cotter pin 25, washer 24 and lever 26;

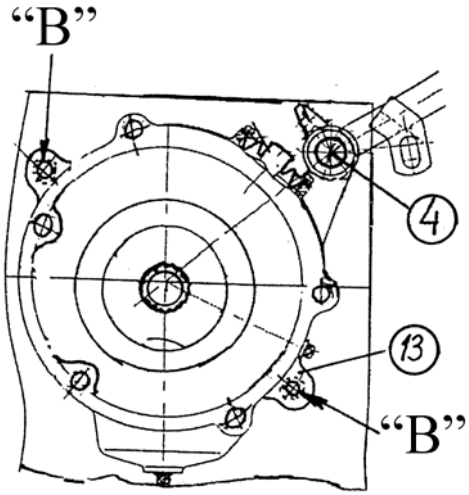
12) loosen checknut 21 and unscrew adjustment bolt 1) off yoke of the right-side foot brake 22;




1 – 1 – cup; 2 – friction disk; 3 – intermediate disk; 4 – pedals' roller; 5 – sealing sheath; 6 – pressure disk; 7 – ball; 8 – parking brake; 9 – cover; 10 –spacer; 11 – parking brake shaft; 12 – drain plug; 13 – brake body; 14 – spacer; 15 – sealing ring; 16 – final drive gear; 17 – check plug (filler); 18 – adjustment bolt of parking brake; 19 – adjustment bolt of right-side foot brake; 20 – bolt; 21 - checkpnut; 2 – yoke.

**Figure 4.157**

13) to dismount body 13 (Figure 4.158) with foot brake as an assembly 2, 3, 6, 7, 22 (Figure 4.157) screw two disassembly bolts in threaded openings "**B**" of brake body; Remove body off mounting splines and pedals' roller 4 (Figure 4.158).



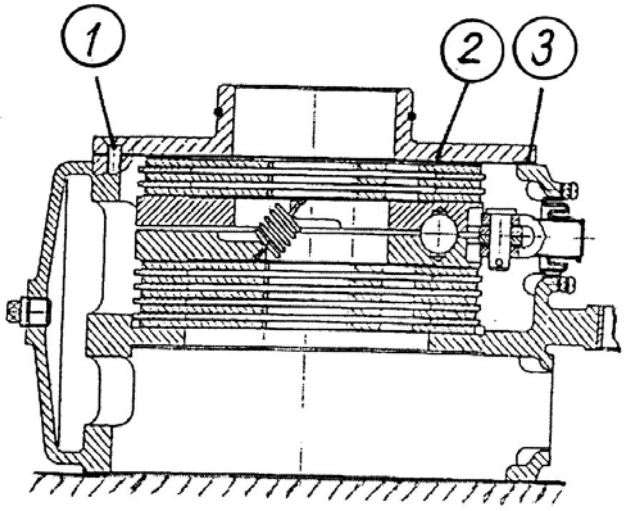

"**B"** Disassembly of opening of brake body. 4 – pedals roller; 13 - body

**Figure 4.158**

14) put body with brake as an assembly on the bench, with cup cover 2 upwards (Figure 4.159) and disassembly the brake, having first unscrewed three screws 1

15) remove cover 2 and spacer 3.

Brake disassembly is similar to disassembly made in item **"н"** see section **4.6.20** "Disassembly of left-side multi-disk foot brake operating in oil bath".




1 – screw; 2 – cover; 3 – spacer

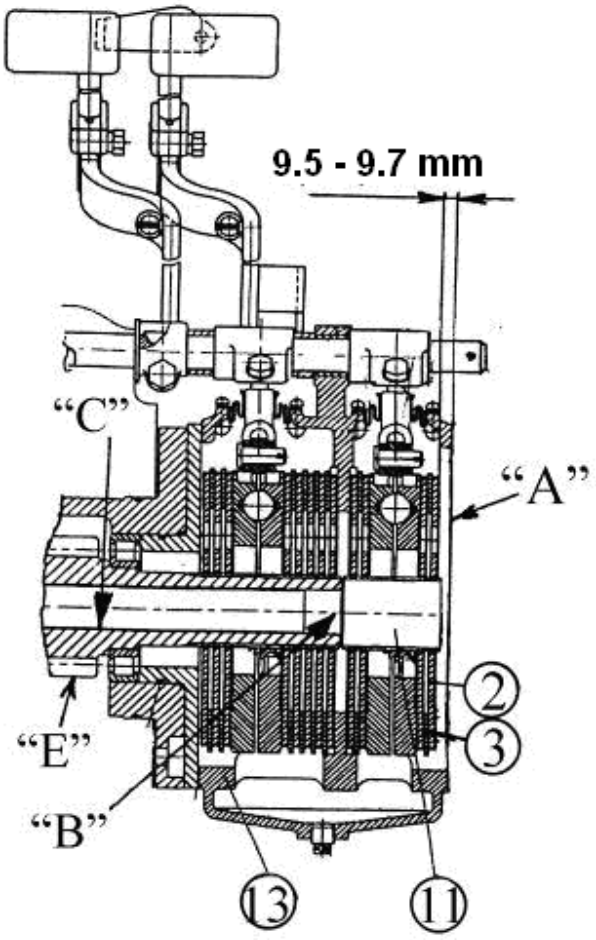
**Figure 4.159**

### 4.6.21 Assembly of right-side foot brake

a) assembly and install the brake in order reverse to disassembly in strict compliance with directions given in section **4.6.21** "Assembly of left-side brake";

b after installation of foot brake insert in opening "**C**" of drive final gear "**E**" the parking brake shaft 11 (Figure 4.160), having first lubricated neck of shaft "**B**" with grease LITOL-24;

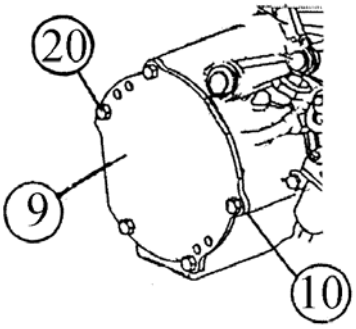
c) mount parts of parking brake (Figure 4.160 internal stack of disks (3 pcs.) in sequence "brake disk (2) > intermediate disk (3) > brake disk", pressure disks as an assembly and external stack of disks, providing recession of brake disk (2) against plane "**A**" of brake body (13) within 9.5…9.7 мм. If necessary, make adjustment of dimension by selecting intermediate disk (3) of required thickness.




2 – brake disk; 3 – intermediate disk; 11 – parking brake shaft; 13 – brake body; “**A**”. Plane.
“**B**”. Parking brake shaft neck.
“**C**”. Opening of drive gear (right-side). “**E**”. Final drive gear.

**Figure 4.160**

d) install spacer 10 and cover 9, (Figure 4.161);
e) ) put and tighten bolts for fastening brake 20, torque of bolts must be within 120…160 N. m.;




9 - cover; 10 - spacer; 20 - bolt

**Figure 4.161**

f) mount on tractor all dismounted parts for control of foot and parking brakes, as well as parts for rear PTO control;

g adjust travel of right-side brake pedal using bolt 19, (Figure 4.163), as described above, see item **"b"** of section **4.6.19** "Assembly of left-side brake";

h) tighten check nut 21;

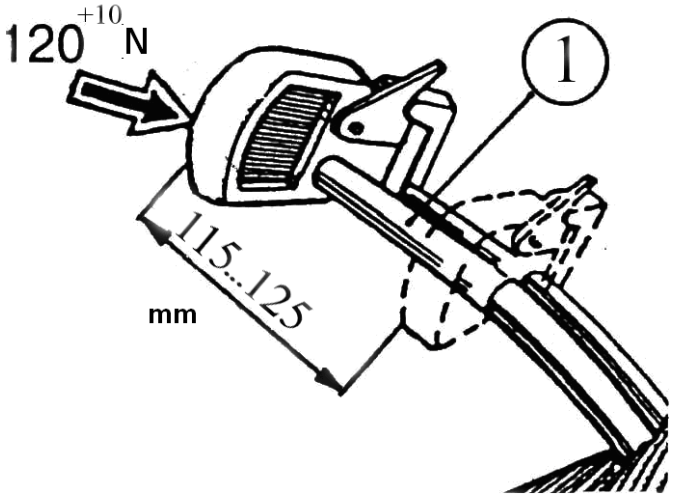
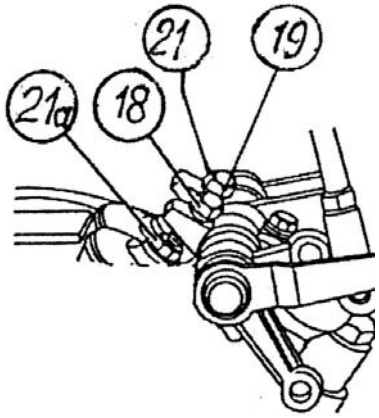



**Figure 4.162**

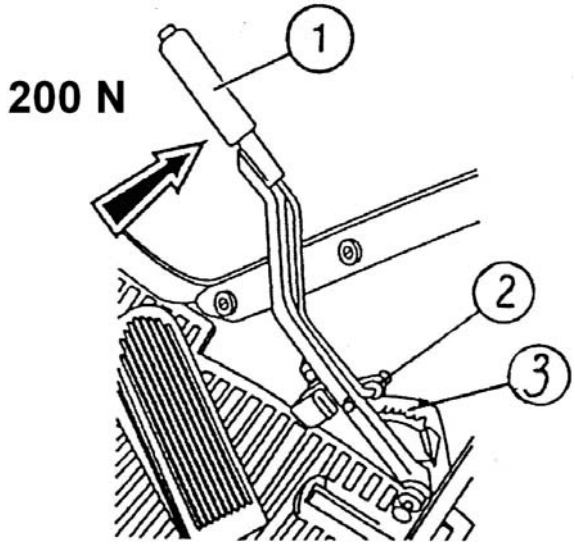



18 – parking brake bolt; 19 – foot brake bolt; 21 - checknut; 21a – checknut

**Figure 4.163**

i) adjust travel of lever 1, (Figure 4.164), parking brake with bolt 18, (Figure 4.163), so that when pulling lever with effort 200 N latch 2 (Figure 4.164) would held in recess between second and third teeth of sector 3;

j) secure bolt with check nut 21a (Figure 4.163).




1 – parking brake lever; 2 - clamp; 3 – sector

**Figure 4.164**

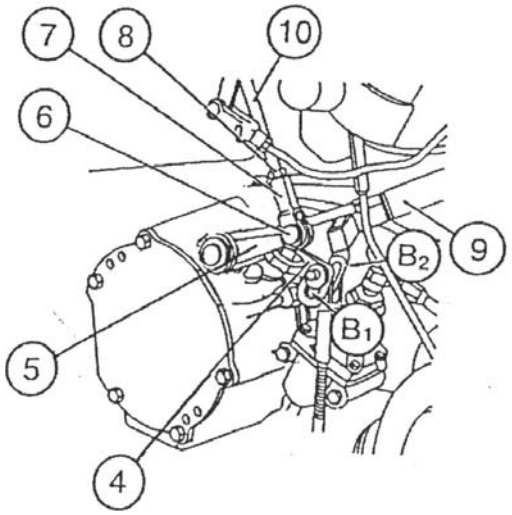
**If the tractor is equipped with pneumatic brake** and operates with trailer equipped with pneumatic brakes, adjust travel of parking brake lever in the following way:

a) shift lever 1, (Figure 4.164), to extreme forward (disengaged) position;

b) loosen check nut 8 and remove pin 6, (Figure 4.165);

c) shift lever 5 so that top edge of groove "**$B_1$**" of lever 4 matched top edge of groove "**$B_2$**" of lever 9 of the right-side brake pedal;

d) by changing length of tie-rod 10 and rotating yoke 7 provide connection of tie-rod 10 to lever 5 by means of pin 6 and cotterpin it;




4 – lever; 5 – lever; 6 – pin; 7 – yoke; 8 – checknut; 9 – lever; 10 – tie-rod;
"$B_1$" – groove of lever (4); "$B_2$" – groove of lever (9).

**Figure 4.165**

e) by turning adjustment bolt 18, (Figure 4.163), adjust travel of lever (1) so that parking brake was fully engaged on the 2nd or 3rd tooth of sector 3 (Figure 4.164);

f) tighten check nut 8 (Figure 4.165) and 21a (Figure 4.163);

g) mount back in place right-side rear wheel, torque wheel fixing nuts to 200…250 N·m.

Take tractor off support.

**Maintenance of brakes operating in oil**

Adjustment operations of "wet" brakes are similar to those of dry brakes: travel of pedals 110…120 mm upon effort of 300 N on one pedal is adjusted with bolts 25, (Figure 4.144).

Oil level in brakes' bodies must reach edge of check plugs openings 22, (Figure 4.145), on face walls of bodies. Operations of changing oil in brakes' body must be carried out at the same time with changing oil in transmission. Grade of oil used for brakes must be the same as for transmission. To drain oil from brakes' body drain plugs (10) are provided in the bottom. (Figure 4.145). Level of oil in bodies is checked each **500** hours of tractor operation.

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**Attention! Operation of brakes without oil or insufficient level of oil is not permitted.**

### 4.7 Disassembly-assembly of brakes control on reversal of BELARUS-1221B.2

Observe the following sequence of brakes control on reversal (Figure 4.166):

a) drain braking fluid from the system, and to do this:

1) take off sheath 1 of reverse 2 main cylinder, remove protective cap from by-pass valve 3 of reverse 4 working brake cylinder;

2) put on by-pass valve 3 one end of hose, and lower another end inside empty vessel;

3) unscrew by-pass valve 3 by ½ of turn;

4) keep pressing pedal 5 until all liquid is removed from the hydraulic system on reversal;

b) dismount major assemblies from tractor, and to do this:

1) disconnect pipeline 6 between main cylinder of reverse 2 and angle 7, by unscrewing cap nuts;

2) disconnect flexible sleeve of brakes 8 between angle7 and working brake cylinder of reverse 4 by unscrewing nuts 9;

3) extract cotter pin 1 (Figure 4.167) and disconnect pusher of main reverse cylinder 2 from pedal 3 by pulling out pin 4;

4) dismount main reverse cylinder 5 from tractor cabin by unscrewing two bolts 6and having dismounted spring 7;

5) extract cotter pin 8 and remove pedal 3 with washer 9 from the axle;

6) remove angle 7 (Figure 4.166), having unscrewed two bolts 10;

7) extract cotter pins and disconnect tie-rod 13, having pulled out pins 14;

8) remove return spring 11, extract cotter pin and pull out pin 12;

9) extract cotter pin 15 and dismount from the axle working brake cylinder of reverse 4 with washer 16.

Make assembly of parts and assemblies of brake control on reversal in sequence reverse to disassembly.

Before assembling main reverse cylinder 2 and working brake cylinder of reverse 4, grease friction surfaces with thin coat of braking fluid NEVA –M under Specification TU 2451-053-36732629-2003. Do not allow ingress of mineral oil, benzene, kerosene and diesel fuel on parts, as these substances lead to swelling of rubber sealants.

Adjust and pump through hydraulic system of brakes control on reversal.

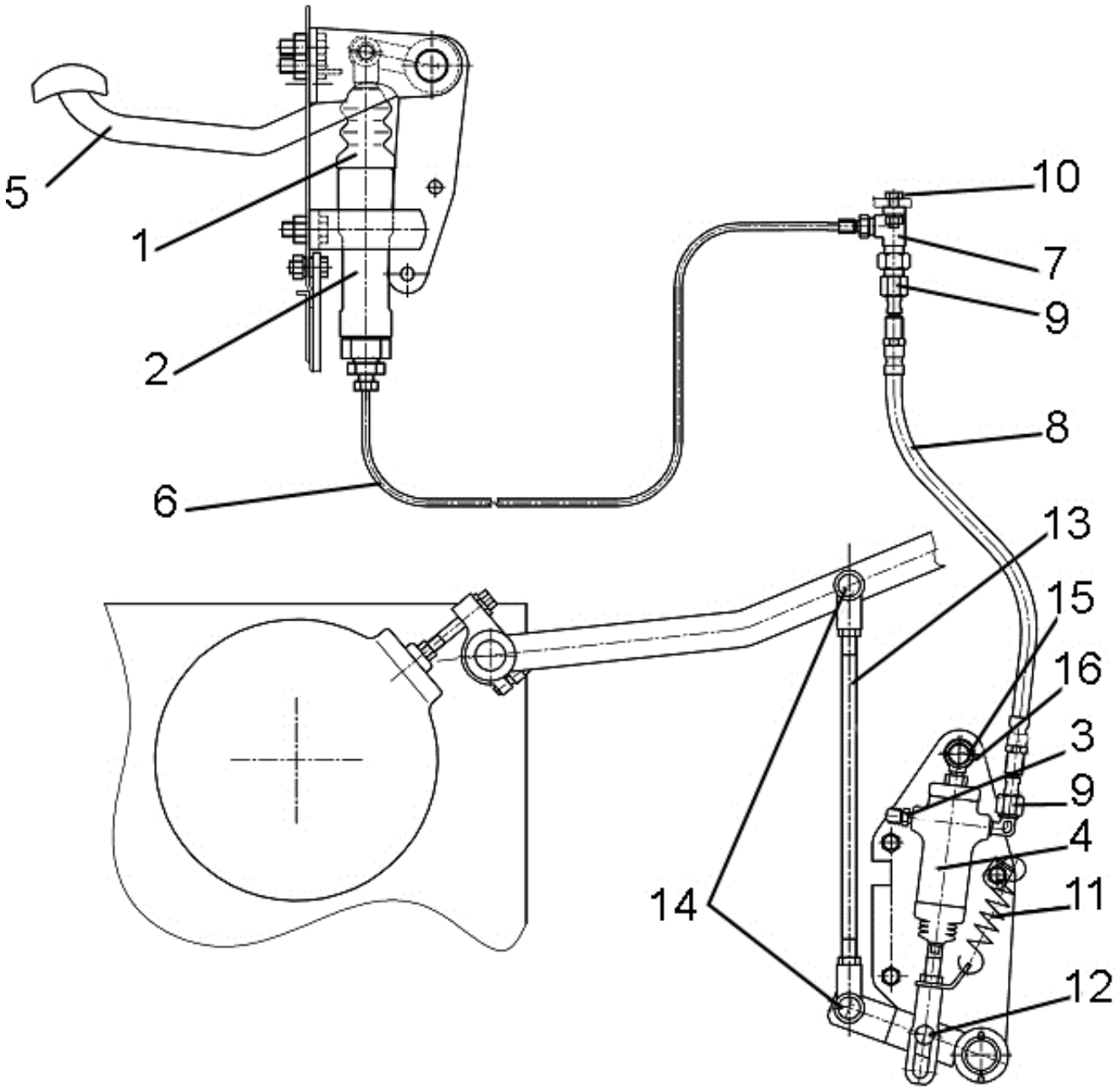



**Figure 4.166**

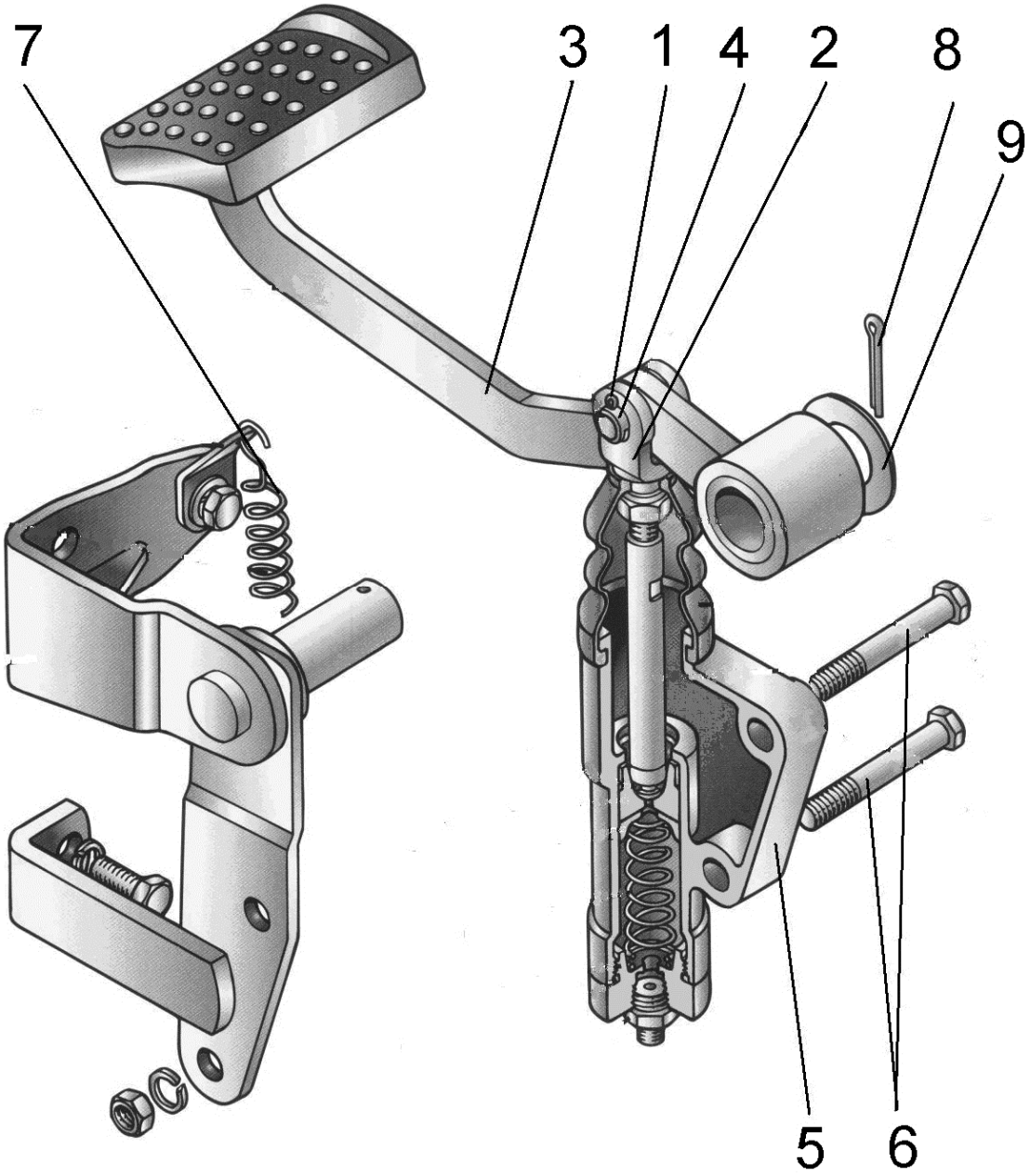



**Figure 4.167**

## 4.8 Dismounting of components of one-wire pneumatic drive of trailer brakes on tractors BELARUS-1221.2/1221.3

**Attention:** Before starting disassembly of components of trailer brakes' pneumatic drive, release compressed air from the system. To do this, pull upwards ring for condensate release valve 6 (Figure 4.168).

**Dismounting of cylinder 10** (Figure 4.168):
a) unscrew screws of ollarов 2, cap nut 5,disconnect from cylinder 10 hose 1 and pipeline 4;
b) unscrew nuts 3, remove collars 9 and cylinder 10;
c) unscrew checknut 8 and disconnect pressure regulator 7 from cylinder 10.

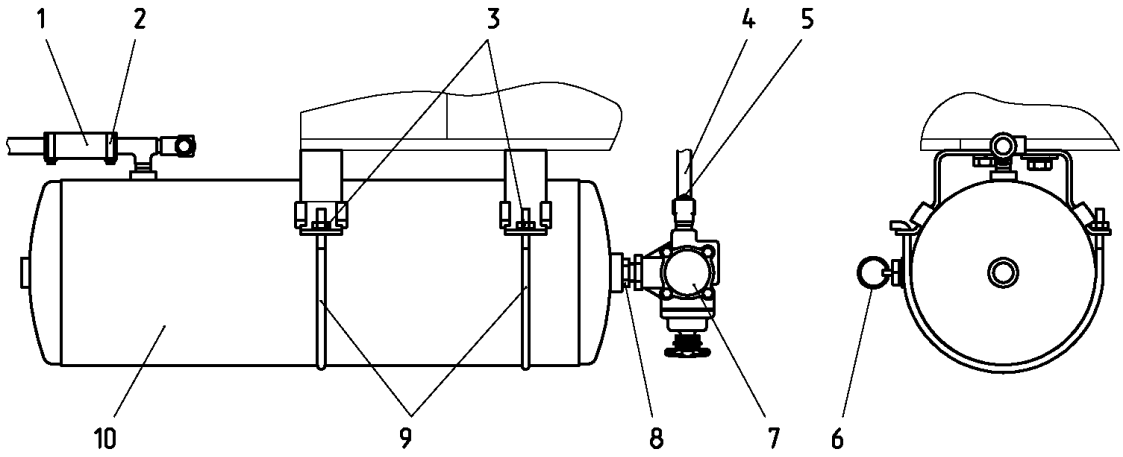



**Figure 4.168**

**Dismounting of braking valve 4** (Figure 4.169):
a) unscrew cap nuts 2 and 7, disconnect from brake valve 4 pipelines 3 and 8;
b) unpin pin 1 and tie-rod 5, pull out pin 1, remove tie-rod 5;
c) unscrew bolts 6, remove brake valve 4.

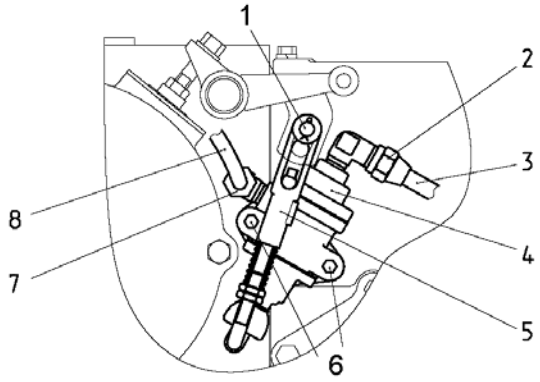



**Figure 4.169**

**Dismounting of connection head 1** (Figure 4.170):

a) unscrew cap nut 3 and disconnect from connection head 1 pipeline 4;
b) unscrew connection pipe 2 and remove connection head 1.

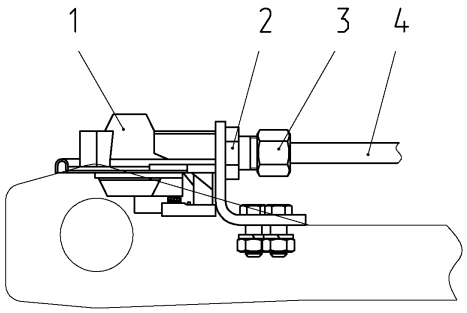



**Figure 4.170**

Make assembly of components of the pneumatic drive of tractor trailer brakes in order reverse to disassembly.

**Attention:** After assembly check air tightness of the system, parameters of pressure regulator and brake valve actuation. Design and principle of operation, procedure of check and adjustment are described in operating manual enclosed with each tractor.

**4.9 Dismounting of components of two-wire pneumatic drive of trailer brakes on tractors BELARUS-1221.2/1221.3**

**Attention:** Before starting disassembly of components of trailer brakes' pneumatic drive, release compressed air from the system. To do this, pull upwards ring for condensate release valve 6 (Figure 4, item 6).

**Dismounting cylinder 10** (Figure 4.171):
a) unscrew cap nuts 2 and 5,disconnect from cylinder 10 pipelines 1 and 4;
b) unscrew nuts 3, remove collars 9 and cylinder 10;
c) unscrew checknut 8 and disconnect pressure regulator 7 from cylinder 10.

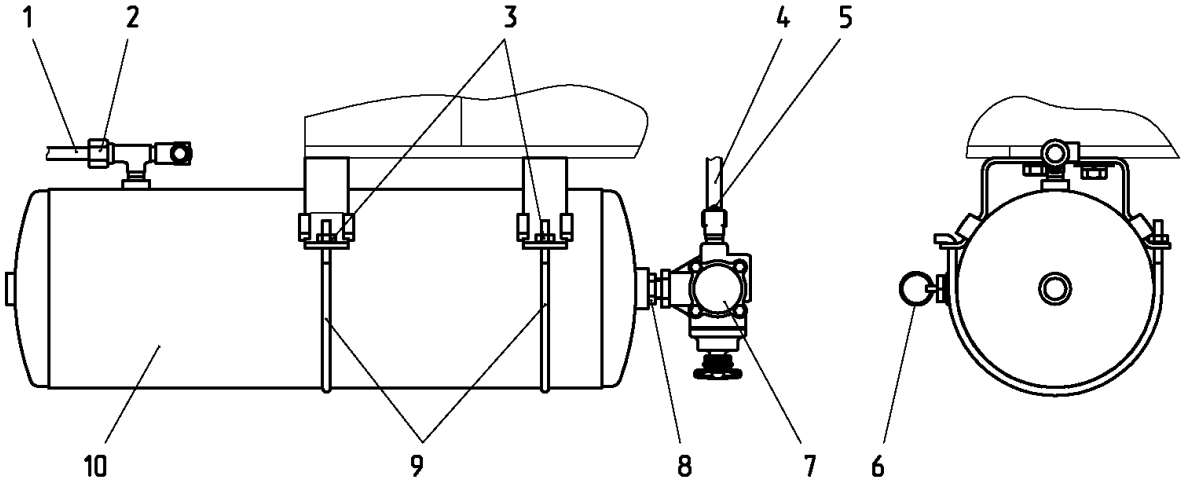



**Figure 4.171**

**Dismounting brake valve 4** (Figure 4.172):

a) unscrew cap nuts 2 and 7, disconnect from brake valve 4 pipelines 3 and 8;
b) unpin pin 1 and tie-rod 5, pull out pin 1, remove tie-rod 5;
c) unscrew bolts 6, remove brake valve 4

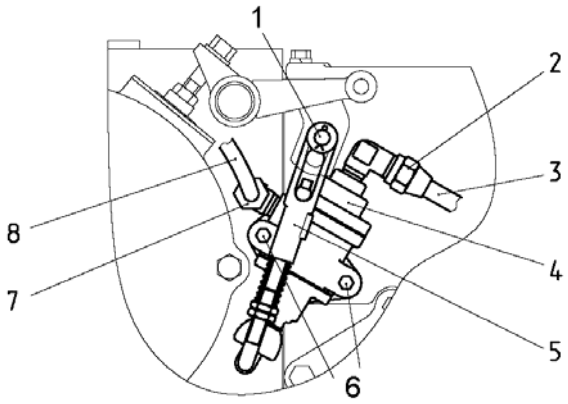



**Figure 4.172**

**Dismounting of connection heads 1 and 5** (Figure 4.173):

a) unscrew cap nuts 3 and 7;
b) disconnect from connection heads 1 and 5 pipelines 4 and 8; and then unscrew connection pipes 2and 6
c) remove connection heads 1 and 5.

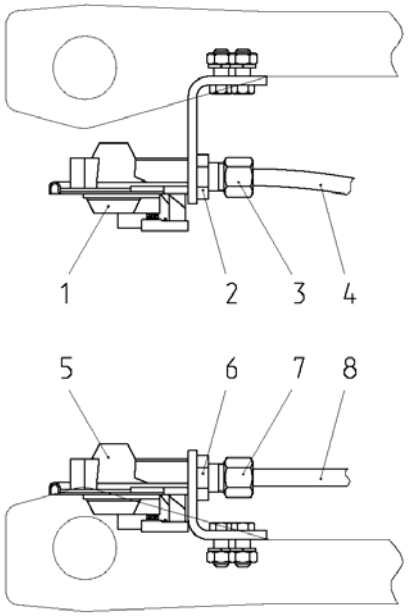



**Figure 4.173**

Make assembly of components of the pneumatic drive of tractor trailer brakes in order reverse to disassembly.

**Attention:** After assembly check air tightness of the system, parameters of pressure regulator and brake valve actuation. Design and principle of operation, procedure of check and adjustment are described in operating manual enclosed with each tractor.

### 4.10 Dismounting of components of combined pneumatic drive of trailer brakes for tractor BELARUS-1221.4 with engine Deutz

**Attention:** Before starting disassembly of components of trailer brakes pneumatic drive, release compressed air from the system. To do this, pull upwards ring for condensate release valve 6 (Figure 4.174).

**Dismounting of cylinder 9** (Figure 4.174):

a) unscrew cap nuts 4, 11, screws of collars 3, disconnect from cylinder 9 hose 2 and pipeline 12;
b) unscrew nuts 1, remove collars 10 and cylinder 9;
c) unscrew check nut 8 and disconnect pressure regulator 7 from cylinder 9.

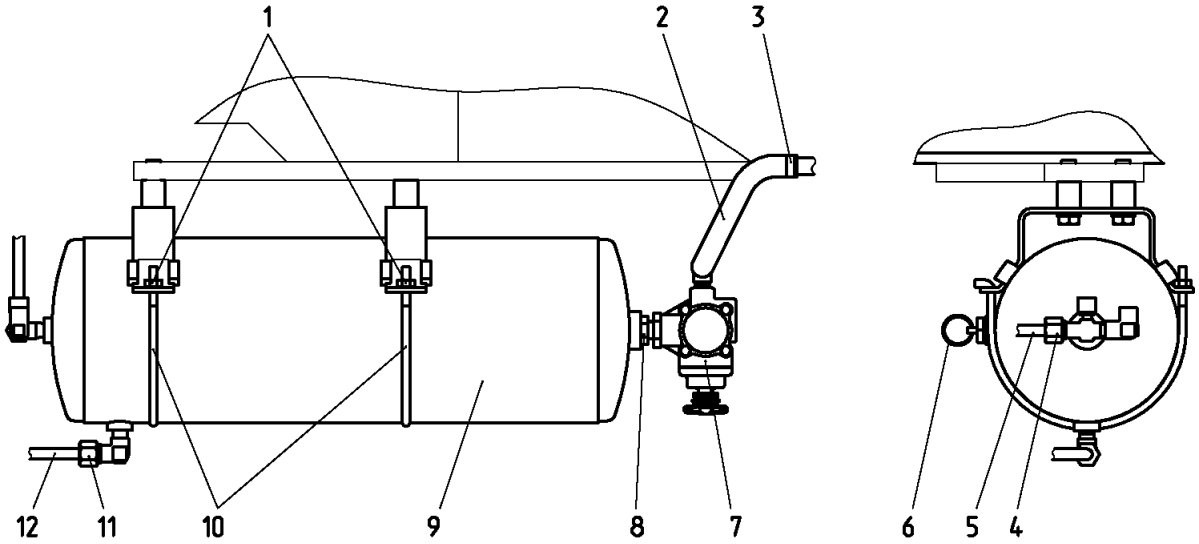



**Figure 4.174**

**Dismounting of brake valves 11 and 14** (Figure 4.175):

a) unscrew cap nuts 2, 3, 6 and 8;
b) disconnect from brake valves 11 and 14 pipelines 1, 5 ,7, 9;
c) unpin pin 4 and tie-rod 12, pull out pin 4;
d) unscrew nuts 10 and dismount brake valve 11 and tie-rod 12;
e) unscrew and extract pins 13 and dismount brake valve 14.

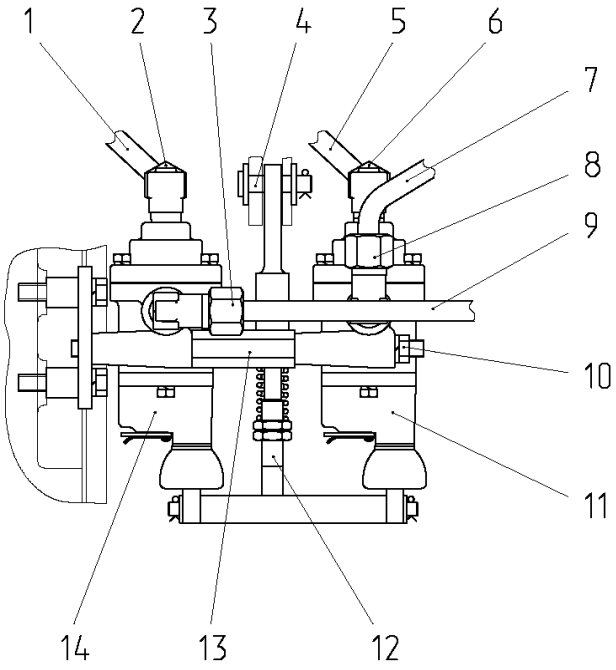



**Figure 4.175**

**Dismounting connection head 1** (Figure 4.176):

a) unscrew cap nut 3 and disconnect from connection head 1 pipeline 4;
b) unscrew connection pipe 2 and remove connection head 1.

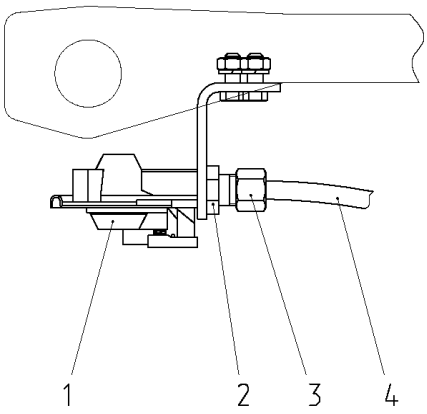



**Figure 4.176**

**Dismounting connection heads 1 and 8** (Figure 4.177):

a) unscrew cap nuts 3 and 6;
b) disconnect from connection heads 1 and 8 pipelines 2 and 5;
c) unscrew connection pipes 4, 7 and remove connection heads 1, 8.

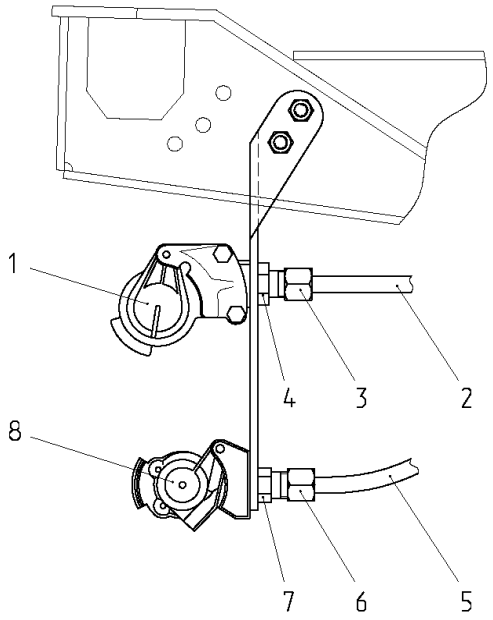



**Figure 4.177**

Make assembly of components of the pneumatic drive of tractor trailer brakes in order reverse to disassembly.

**Attention:** After assembly check air tightness of the system, parameters of pressure regulator and brake valve actuation. Design and principle of operation, procedure of check and adjustment are described in operating manual enclosed with each tractor.

**4.11 Dismounting of components of one-wire pneumatic drive of trailer brakes for tractor BELARUS-1221.4 with engine MMZ**

**Attention:** Before starting disassembly of components of trailer brakes' pneumatic drive, release compressed air from the system. To do this, pull upwards ring for condensate release valve 9 (Figure 4.178).

**Dismountingof cylinder 4** (Figure 4.178):

a) unscrew cap nut 2, screws of collars 7, disconnect from cylinder 4 hose 8 and pipeline 1;
b) unscrew nuts 10, remove collars 3 and cylinder 4;
c) unscrew check nut 5 and disconnect pressure regulator 6 from cylinder 4.

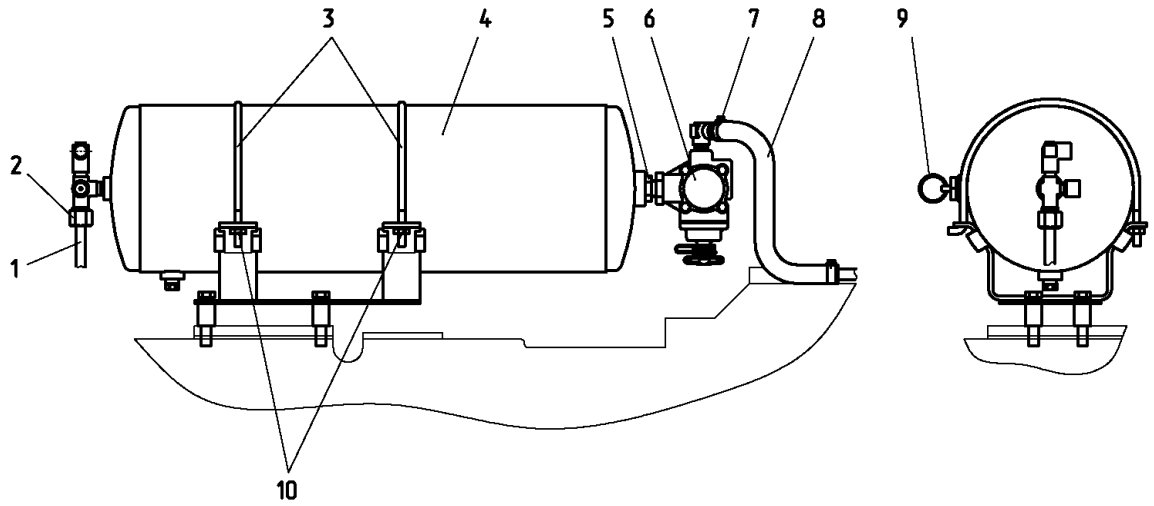



**Figure 4.178**

**Dismounting of brake valve 4** (Figure 4.179):

a) unscrew cap nuts 2 and 7, disconnect from brake valve 4 pipelines 3 and 8;
b) unpin pin 1 and tie-rod 5, pull out pin 1, remove tie-rod 5;
c) unscrew bolts 6, remove brake valve 4

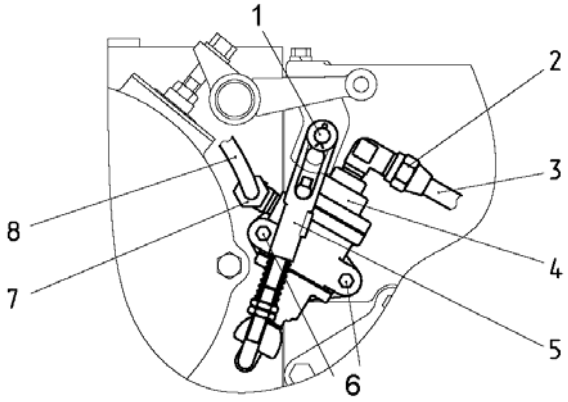



**Figure 4.179**

**Dismounting of connection head 1** (Figure 4.180):
a) unscrew cap nut 3 and disconnect from connection head 1 pipeline 4;
b) unscrew connection pipe 2 and remove connection head 1.

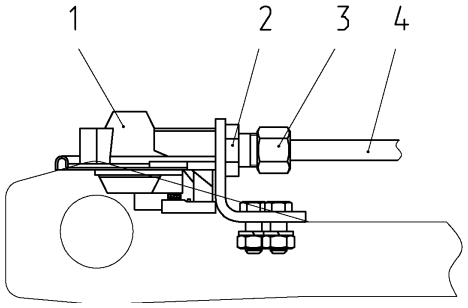



**Figure 4.180**

Make assembly of components of the pneumatic drive of tractor trailer brakes in order reverse to disassembly.

**Attention:** After assembly check air tightness of the system, parameters of pressure regulator and brake valve actuation. Design and principle of operation, procedure of check and adjustment are described in operating manual enclosed with each tractor.

### 4.12 Dismounting of components of two-wire pneumatic drive of trailer brakes

**Attention:** Before starting disassembly of components of trailer brakes' pneumatic drive, release compressed air from the system. To do this, pull upwards ring for condensate release valve 9 (Figure 4.181).

**Dismounting of cylinder 4** (Figure 4.178):

a) unscrew cap nut 2, screws of collars 7, disconnect from cylinder 4 hose 8 and pipeline 1;
b) unscrew nuts 10, remove collars 3 and cylinder 4;
c) unscrew check nut 5 and disconnect pressure regulator 6 from cylinder 4.

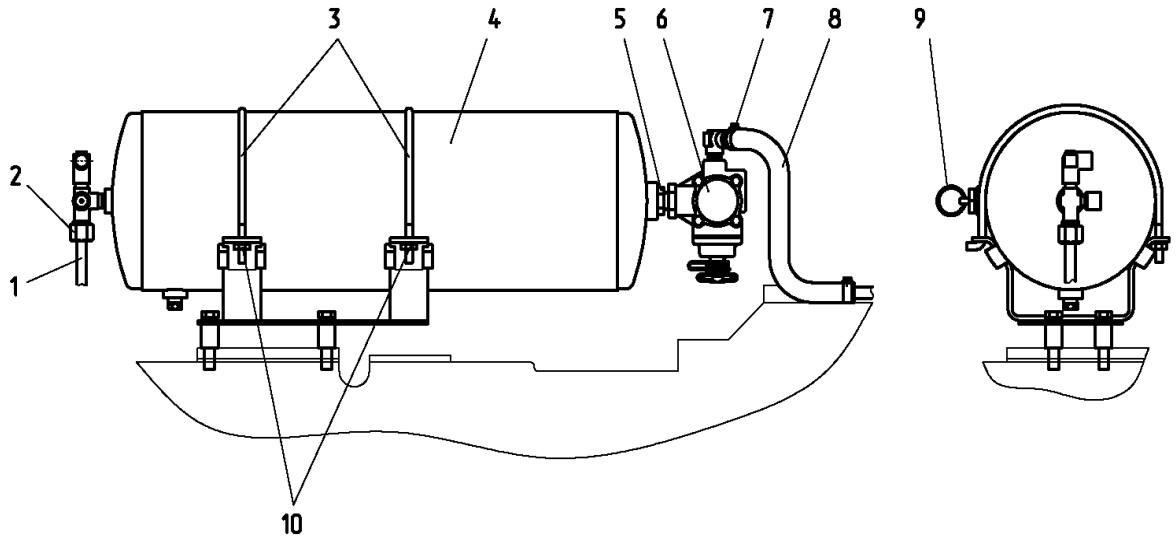



**Figure 4.181**

**Dismountinga brake valve 4** (Figure 4.182):
a) unscrew cap nuts 2 and 7, disconnect from brake valve 4 pipelines 3 and 8;
b) unpin pin 1 and tie-rod 5, pull out pin 1, remove tie-rod 5;
c) unscrew bolts 6, remove brake valve 4

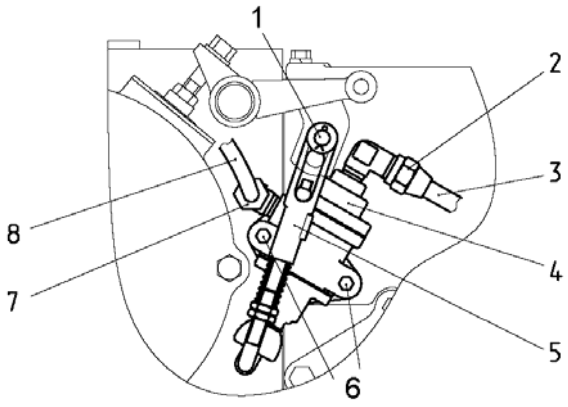



**Figure 4.182**

**Dismounting of connection heads 1, 5** (Figure 4.183):
a) unscrew cap nuts 3and 7 and disconnect from connection heads 1 and 5 pipelines 4 and 8;
b) unscrew connection pipes 2, 6 and remove connection heads 1, 5.

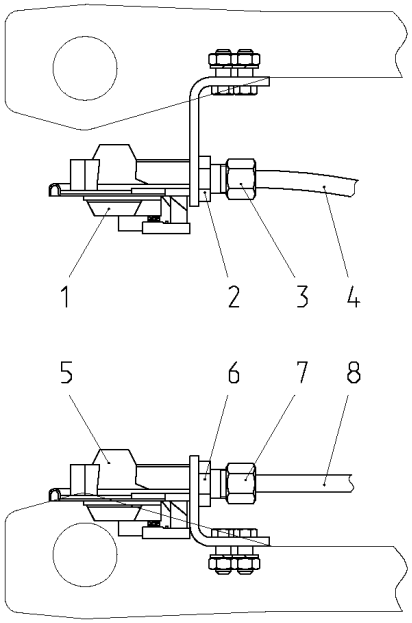



**Figure 4.183**

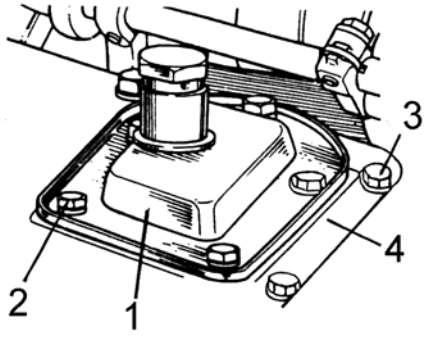
Make assembly of components of the pneumatic drive of tractor trailer brakes in order reverse to disassembly.

**Attention:** After assembly check air tightness of the system, parameters of pressure regulator and brake valve actuation. Design and principle of operation, procedure of check and adjustment are described in operating manual enclosed with each tractor.

## 4.13 Disassembly-assembly of rear PTO

**Dismounting of hatch cover and rear axle cover:**

a) unscrew four bolts 2 (M8x16) and one bolt M12x20 (Figure 4.184), dismount access hatch cover (1) and spacer;
b) unscrew nineteen bolts (3) (M12x30), dismount cover of rear axle body (4) and spacer.

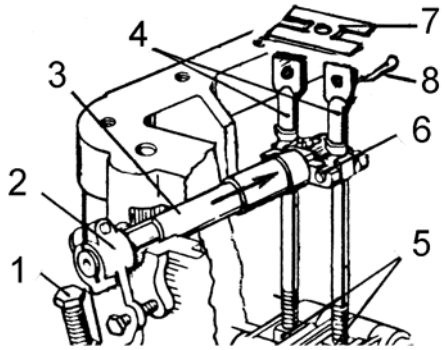



1 – access hatch cover; 2 – bolt; 3 – bolt; 4 – cover of rear axle body

**Figure 4.184**

**Dismounting of cover of PTO planetary reduction gear:**

a) unscrew bolt 1 (Figure 4.185), loosen tightening screw and take lever (2) off control roller 3;
b) unpin and take off lock 7, unscrew adjustment screws 4 off nuts 5;
c) extract roller 3 with axles of screws 6 fastened to it 6 from rear axle body towards inside of body

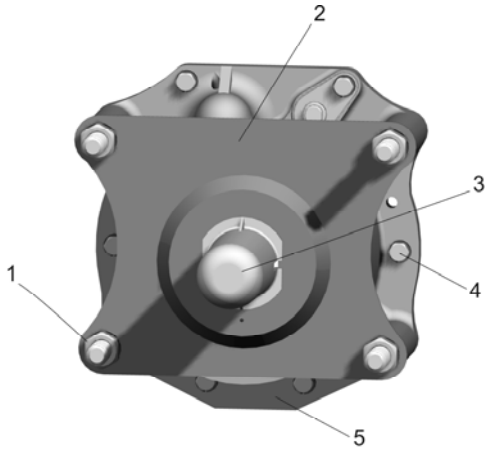



1 – adjustment bolt; 2 – lever; 3 – control roller; 4 – adjustment screws; 5 – nuts; 6 – screw axle; 7-lock; 8-cotter pin.

**Figure 4.185**

d) unscrew bolts 4 and take off cap 3, (Figure 4.186);

e) unscrew nuts 1 and take off guarding 2;
f) unscrew six boltов 4 (M10x35 – 5 pcs.шт., M10x40 – 1 pc.);
g) ) screw two disassembly bolts inside cover 5 and dismount planetary PTO reduction gear off rear axle body;
h) remove spacer.
.

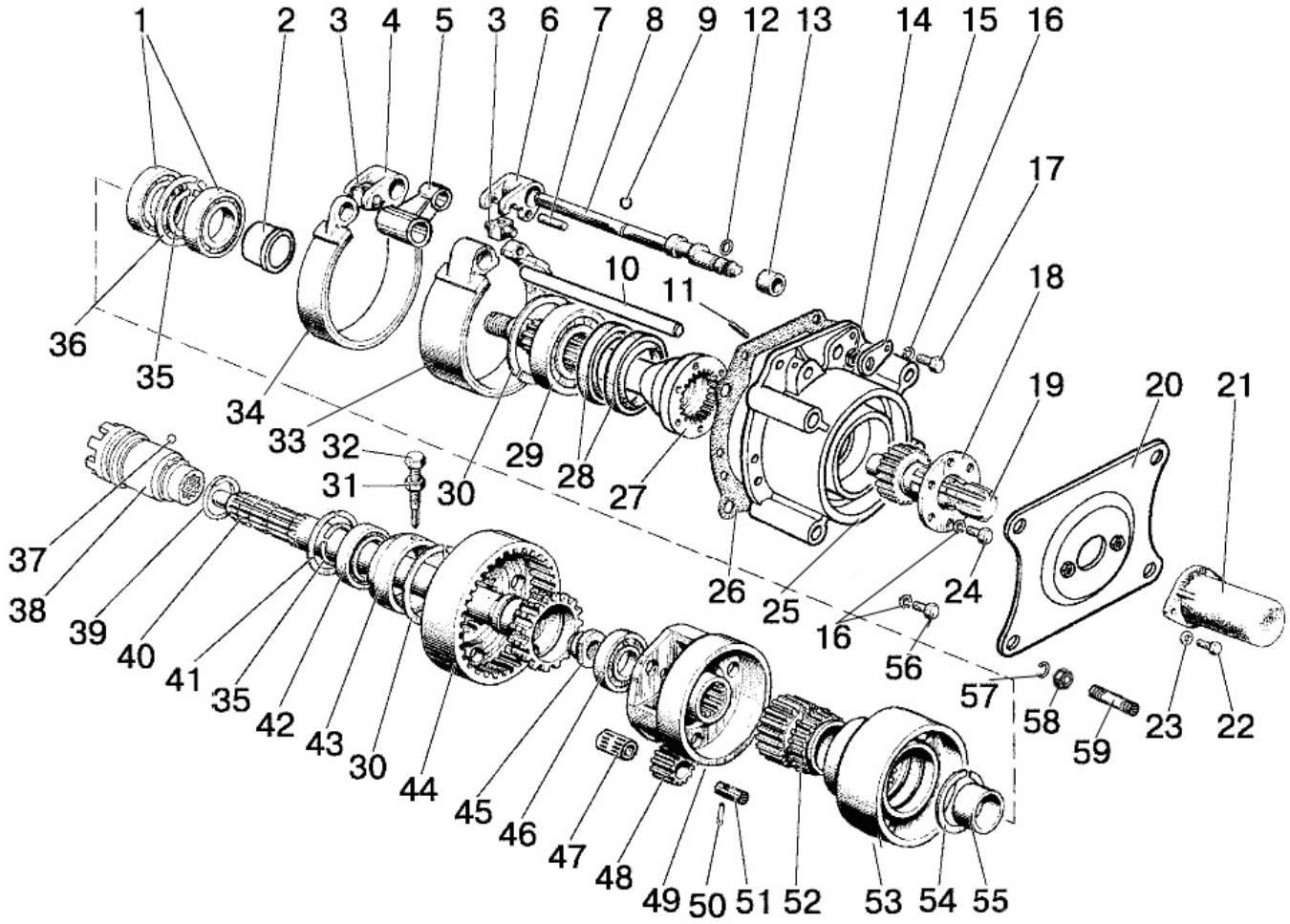



1 – nut; 2 – guarding; 3 – cap; 4 – bolt 5 – bolt; 6 – rear PTO cover (planetary reduction gear)

**Figure 4.186**

**During subsequent assembly:**
a) put spacing back in place;
b) put and fasten with bolts 4, (Figure 4.186) cover of PTO (torque - 30…35 N m);
c) put adjustment screws 4, (Figure 4.185). For adjustment of PTO control see section **4.13.1** “Disassembly-assembly of rear PTO control”;

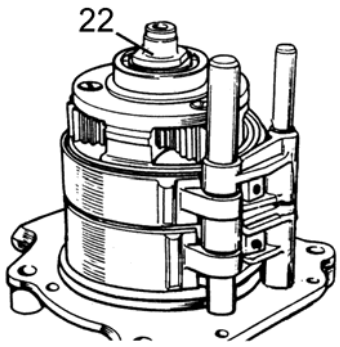
**Disassembly-assembly of planetary PTO reduction gear**




1 – bearing; 2 – bushing; 3 – nut; 4 – lever; 5 – arm; 6 – lever; 7 – pin; 8 – shaft; 9 – ring, 10 – axle; 11 – pin,12 – ring; 13 – bushing; 14 – ring; 15 – plate; 16 – washer; 17 – bolt; 18 – plate; 19 – shank; 20 – plate; 21 – cap; 22 – bolt; 23 – washer; 24 – bolt; 25 – cover; 26 – spacer; 27 – shaft; 28 – cealing ring; 29 – bearing; 30 – ring; 31 – nut; 32 – assembly screw; 33,34 – band; 35,36 – ring; 37 – ball; 38 – clutch; 39 – ring; 40 – shaft; 41 – ring; 42 – bearing; 43 – cup; 44 – crown gear; 45 – nut; 46 – bearing; 47 – bearing; 48 – satellyte; 49 – carrier; 50 – pin; 51 – satellite axle; 52 – sun gear; 53 – drum; 54 – ring; 55 – bushing;56 – bolt; 57 – washer; 58 – nut; 59 – pin.

**Figure 4.187**

a) unscrew nut 22 (figures 4.187 and 4.188);

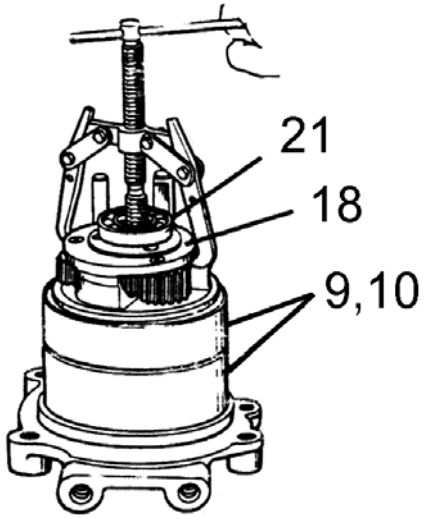



22 – nut

**Figure 4.188**;

b) press out bearing 21 and carrier 18 together with satellites 19 (figures 4.187, 4.189);

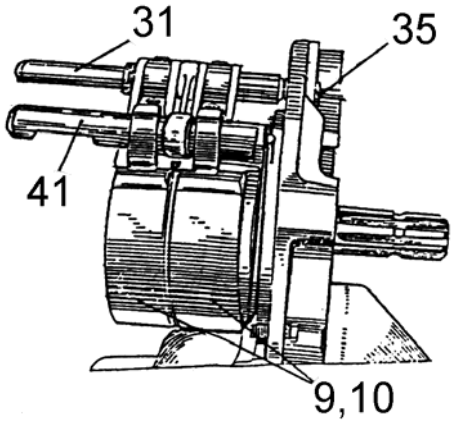
**During subsequent assembly** bearing (21) pust be pressed in carrier (18) to the end of shoulder (Figure 4.189);




21 – ball bearing; 18 – carrier; 9, 10 – brake band

**Figure 4.189**

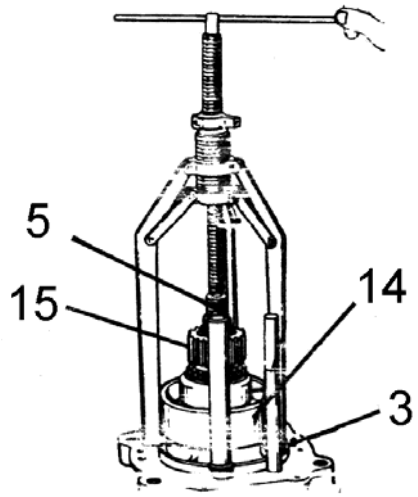
a) remove lock ring35 and eccentric shaft 31 together brake bands 9, 10 (Figure 4.190);
b) remove levers with shaft 31 and axles 41;




9, 10 – brake band; 31- eccentric shaft; 35 – check ring; 41 – axle

**Figure 4.190**

**ATTENTION!** When tractor is equipped with planetary PTO reduction gear having wider brake band on driven drum (sun drum), make subsequent assembly in a way for wider band (B=56 mm) to be on the side of PTO cover



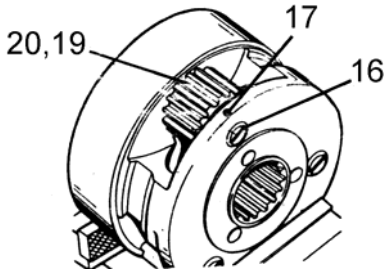

3 – cover; 5 – shaft; 14 – engagement drum; 15 – sun gear.

**Figure 4.191**

c) dismount engagement drum 14 together with sun gear 15 (Figure 4.191);
d) remove shaft 27, collars 28 and bearing 29 from cover 25 (Figure 4.187);

**During subsequent assembly** lubricate collars with consistent grease.

**Dismounting of carrier:**
a) knock out pins 17 (Figure 4.192) and axles 16, remove satellites 19 with bearings 20 as an assembly.




16 – axle; 17 – pin; 19 - satellite; 20 – bearing.

**Figure 4.192**

**During subsequent assembly:**

a) lubricate openings matching satellites' bearings with consistent grease;

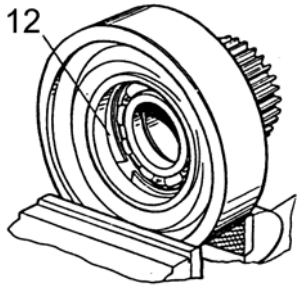
b) openings in satellites' axles must be aligned with carrier openings for pressing in pins. Radial lubrication openings must face from centre outwards;

c) press in pins flush with carrier surface;

d) satellites must rotate on axles smoothly and without jams.

**Dismounting of sun gear with drum:**

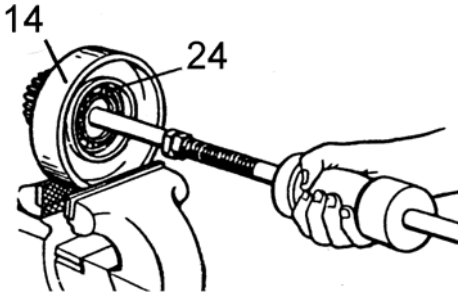
a) remove lock ring 12 (Figure 4.193);




12 – check ring

**Figure 4.193**

b) press bearing 24 (Figure 4.194) out of drum 14 using inertial hammer;

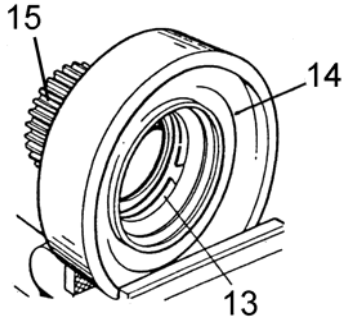



14 – drum; 24 – bearing

**Figure 4.194**

**During subsequent assembly** press bearings in a way to provide installation of check rings;

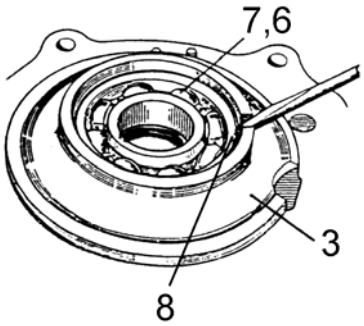
c) remove lock ring 13 (Figure 4.195) and disconnect from drum 14 sun gear 15;




13 – lock ring; 14 – drum; 15 – sun gear

**Figure 4.195**

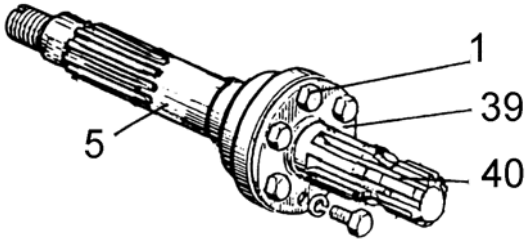
d) remove lock ring 8 (Figure 4.196) and press bearing 7 with collar 6 off cover 3;




3 – cover; 6 – collar; 7 – ball bearing; 8 – lock ring

**Figure 4.196**

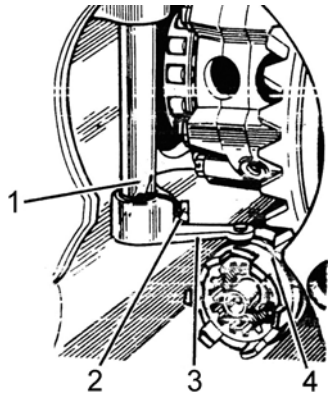
e) unscrew six bolts 1 (Figure 4.197), remove plate 39 and disconnect removable shank 40 from shaft 5;




1 – bolt M10x18 (6 pcs.); 5 – PTO shaft; 39 – plate; 40 – replaceable PTO shank; 5 – PTO shaft

**Figure 4.197**

**Dismounting of control roller and shift clutch:**
a) remove safety wire and unscrew locking bolt 2 (Figure 4.198);
b) remove lead 3 and control roller 1;
c) remove shift clutch лючения 4;

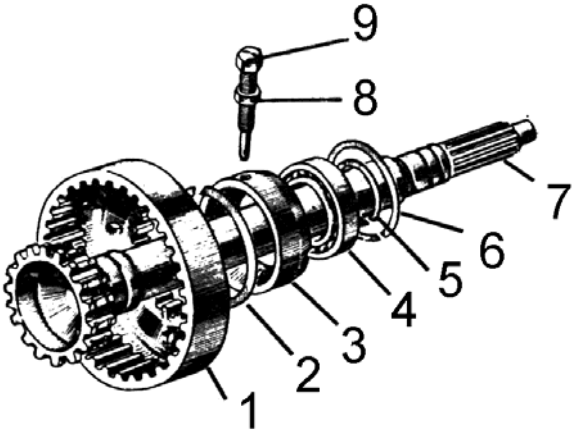



1 – control roller; 2 – locking bolt; 3 – lead; 4 – shift clutch

**Figure 4.198**

**During subsequent assembly:**
Tighten locking screw and securely lock with wire.

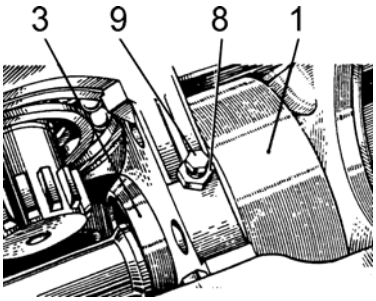
**Dismounting of crown gear as an assembly**




1 – crown gear; 2 – locking ring 2B110; 3 – bearing cup; 4 – ball bearing 210A; 5 – locking ring 2B50; 6 – locking ring 2B90; 7 – shaft; 8 – nut M12; 9 – locking screw

**Figure 4.199**

a) loosen check nut 8 (figures 4.199, 4.200) and unscrew locking screw 9;




1 – crown gear; 3 – cup; 8 – check nut; 9 – locking screw

**Figure 4.200**

b) knock out crown gear shaft 7 as an assembly with gear 1, cup 3 and bearing 4 (Figure 4.199);
c) dismount shift clutch (if it is still in place) (Figure 4.201);

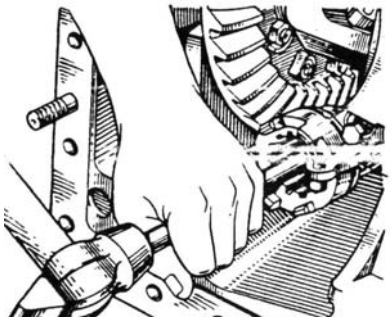
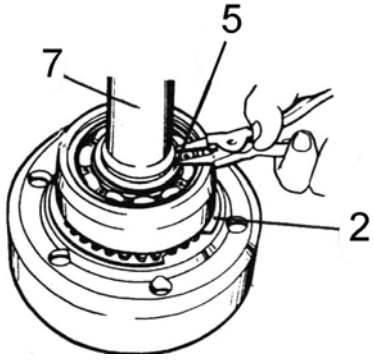


**Figure 4.201**

d) remove locking ring 5 from crown gear shaft 7 (Figure 4.202);




2, 5 – locking ring; 7 – shaft

**Figure 4.202**

e) ) press cup with bearing as an assembly 3, 4, (Figure 4.199) off crown gear shaft through crown gear opening 1 (Figure 4.203);

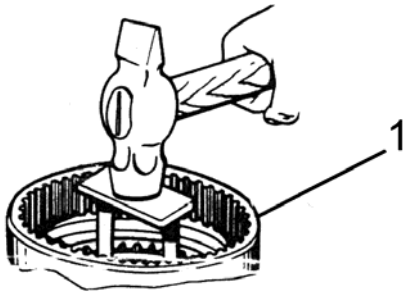
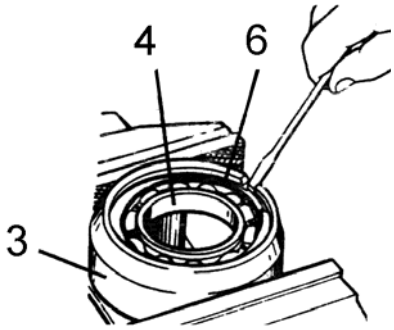



**Figure 4.203**

e) remove locking ring 2 (Figure 4.202), and disconnect crown gear from shaft 7;
f) remove locking ring 6 (Figure 4.204) and press ball bearing 4 off cup 3;




3 – cup; 4 – bearing; 6 – locking ring

**Figure 4.204**

**During subsequent assembly:**

a) before mounting crown gear inside rear axle body, align opening «A» (Figure 4.205) in rear axle body and in cup (3) to put locking screw 9, (Figure 4.200). torque screw to 8..10 N•m., checknut 8 – to 85…95 N•m
b) bearing must be pressed in the cup in the initial position.

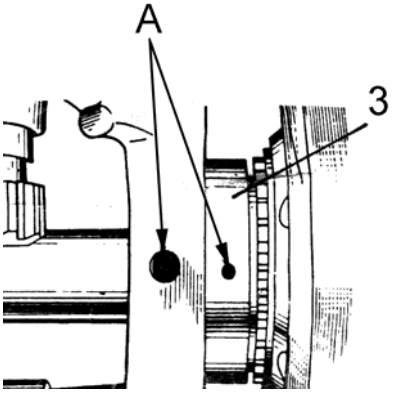
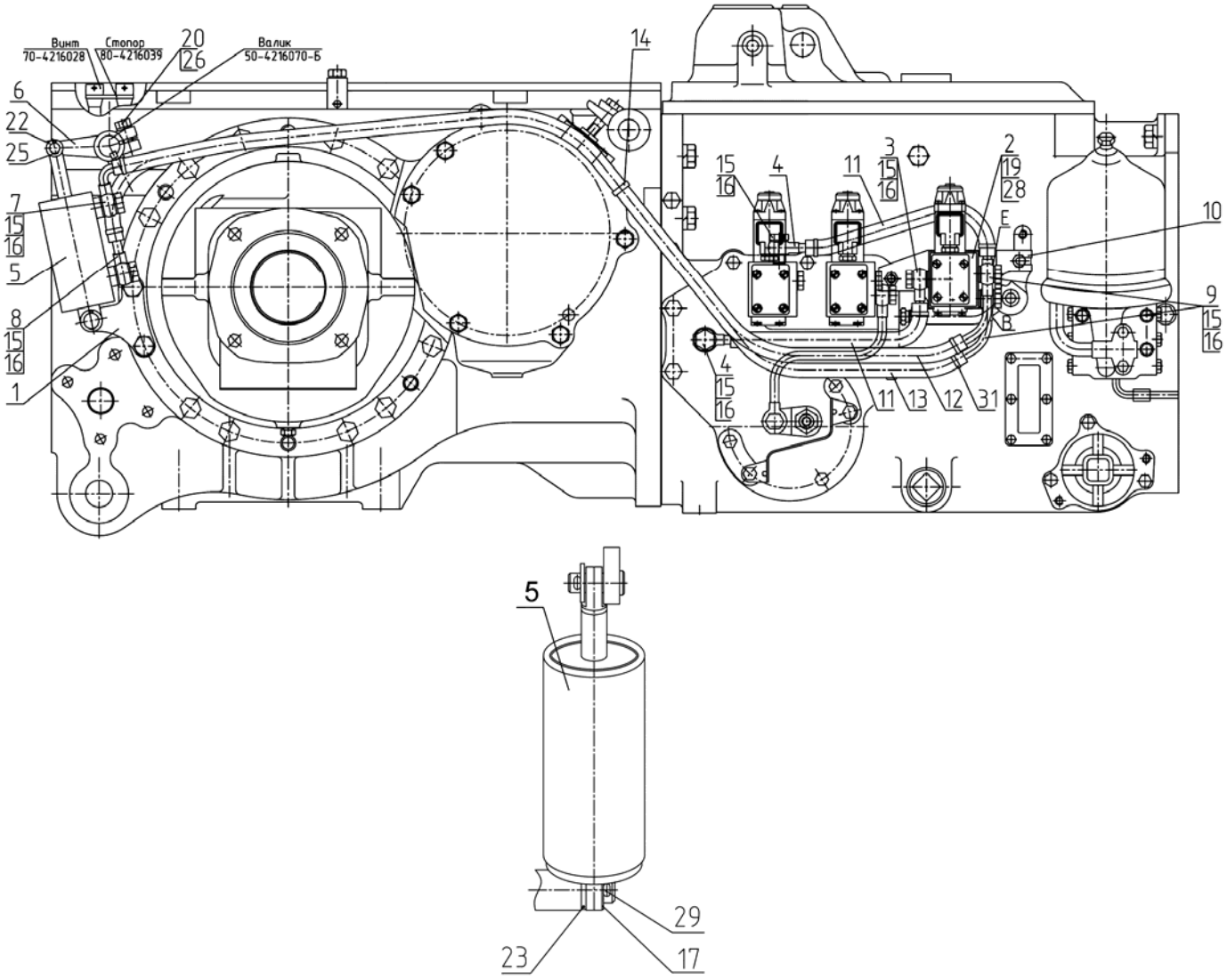



**Figure 4.205**

### 4.13.1 Disassembly-assembly of rear PTO control

**Control of rear PTO 1221M-4216005** – electrohydraulic and mounted on tractors equipped with brakes operating in oil bath (wet brakes).

**ATTENTION:** Disassembly-assembly of rear PTO control 1221M-4216005 must be made on shut-off tractor



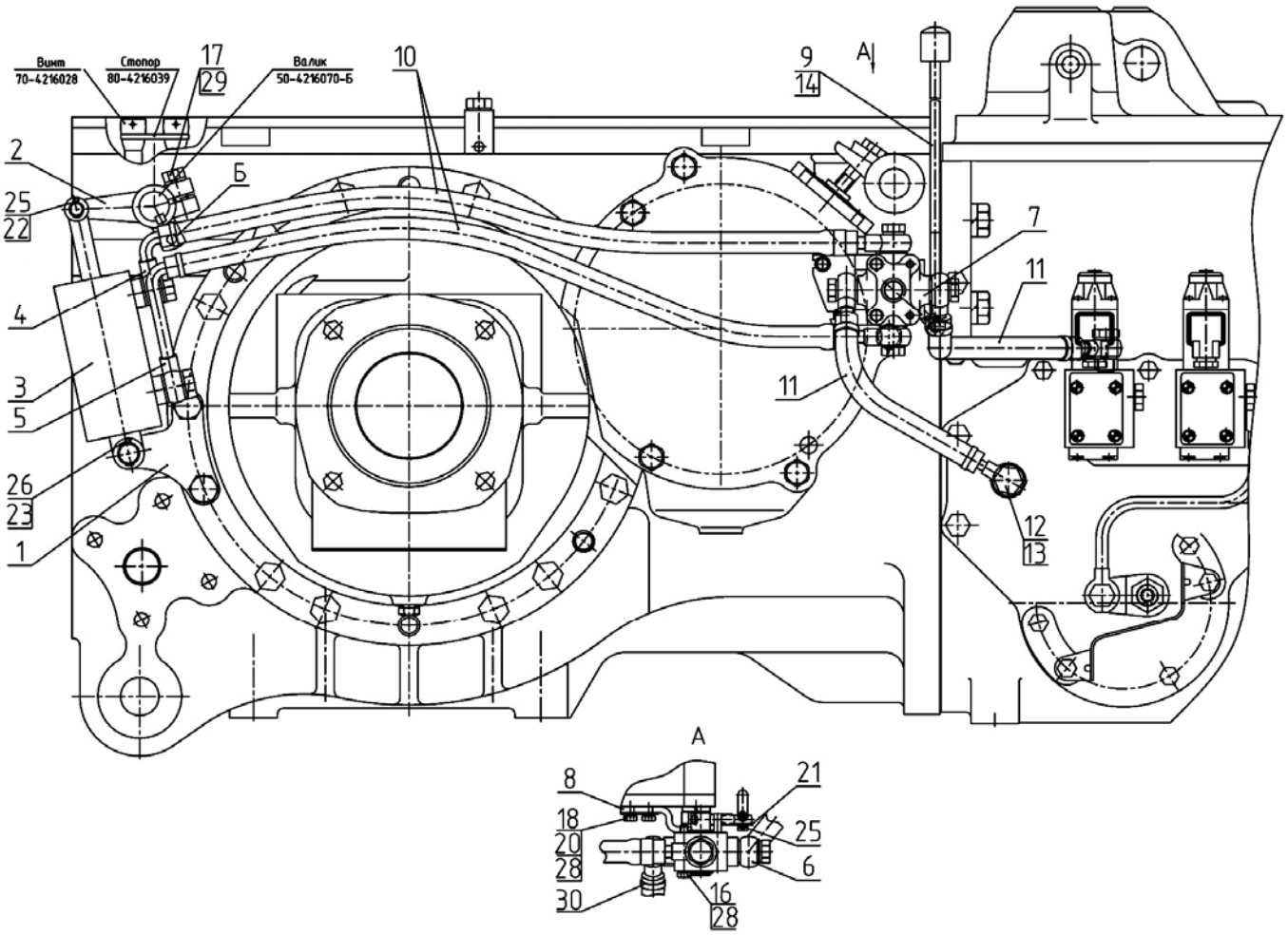

1-arm; 2-plate with distributor; 3-oil line; 4-tip; 5-hydraulic cylinder; 6-lever; 7-oil line; 8-oil line; 9-oil line; 10-arm; 11- sleeve; 12-sleeve; 13-sleeve; 14-collar; 15-bolt; 16-ring; 17-washer; 19-bolt M8; 20-bolt M12; 22-washer; 23-washer; 25-cotter pin; 26-washer; 28-washer; 29-cotter pin; 31-collar.

**Figure 4.206** Control of rear PTO (1221M-4216005)

a) to dismount sleeves 11, 12, 13 (Figure 4.206) unscrew bolts 15 and remove rings 16 and sleeves 11, 12, 13;
b) to dismount hydraulic cylinder 5, remove cotter pina 25 и 29 and washers 17 and 22.
c) to dismount lever 6, unscrew bolt 20.

**Control of rear PTO 1221B-4216005** – hydromechanical and mounted on tractors equipped with brakes operating in oil bath (wet brakes), and provided with reversible control station.

**ATTENTION:** Disassembly-assembly of rear PTO control 1221B-4216005 must be made on shut-off tractor only.




1-arm; 2-lever; 3-hydraulic cylinder; 4, 5, 6-oil lines; 7-valve; 8-arm; 9-tie-rod; 10, 11- sleeves; 12, 16, 17, 18-bolts; 13, 20, 21, 22, 23, 28, 29-washers; 14- handle; 25, 26-cotter pins.

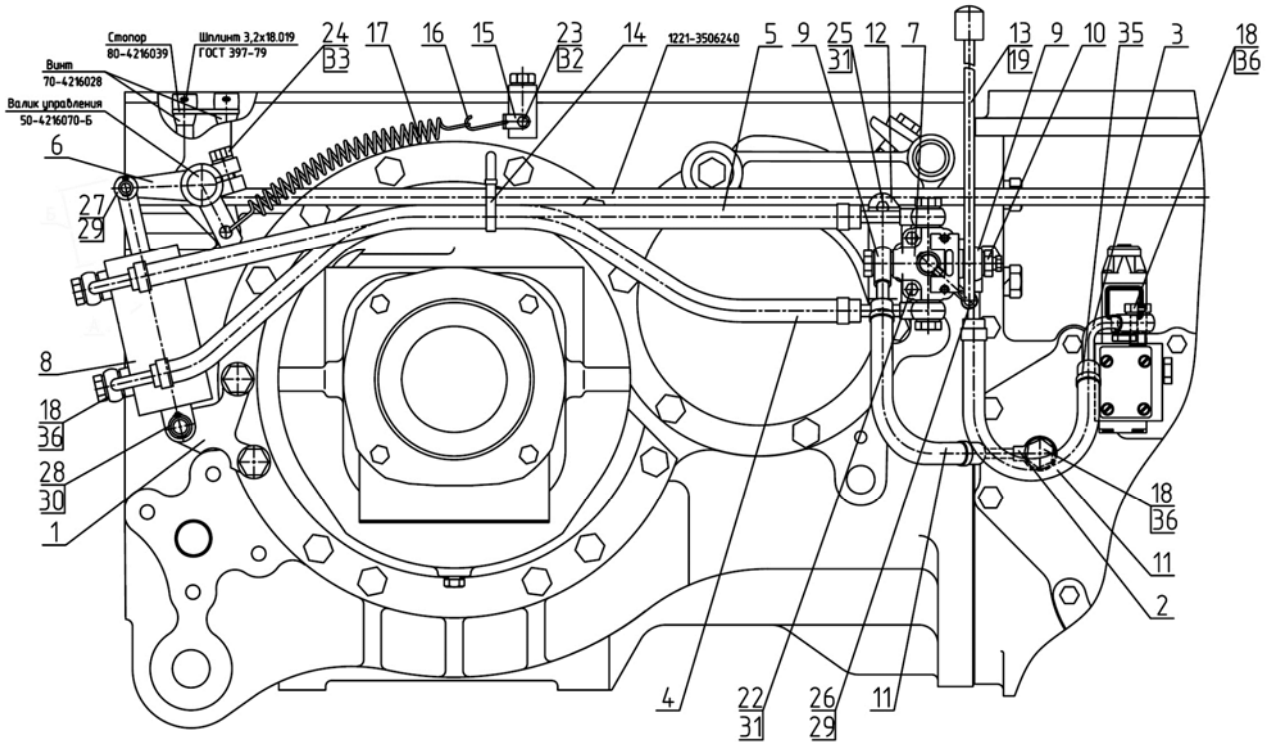
**Figure 4.207** Control of rear PTO (1221B-4216005)

a) to dismount sleeves 10, 11 (Figure 4.207) with oil lines 4, 5, 6 unscrew bolts 12 and remove washers 13;
b) dismount hydraulic cylinder 3, having removed cotter pins 25 and 26 and washers 22 and 23;

c) dismount lever 2, having unscrewed bolt 17;
d) dismount tie-rod 9 with handle 14, and to do this remove cotter pin 25 (view “A”) and washer 21;
e) remove valve 7 and arm 8,to which it is fastened, having unscrewed two bolts 18 with washers 20 and 28.

**Control of rear PTO 1221-4216100** – is hydromechanical and is mounted on tractors of dry type (dry brakes).

**ATTENTION:** Make disassembly-assembly of rear PTO control 1221-4216100 on shut-off tractor only.




1-arm; 2, 3-tips; 4, 5-pipelines; 6 -lever; 7-valve; 8-hydraulic cylinder; 9-oil line; 10-bolt; 11-sleeve; 12-plate; 13-tie-rod; 14-collar; 15-triangular; 16- hook; 17-spring; 18-bolt; 19-handle; 22, 23, 24, 25-bolts; 26, 27, 28-washers; 29, 30-cotter pins; 31, 32, 33, 36-washers; 35-collar.

**Figure 4.208** Control of rear PTO (1221-4216100)

a) to dismount pipelines 4, 5 (Figure 4.208) sleeves 11 from oil lines 9, unscrew bolts 18 и 10,and remove washers 36;
b) dismount hydraulic cylinder 8, and to do this remove cotter pins 29 and 30 and washers 27 and 28;
c) to dismount lever 6 unscrew bolts 24,that squeeze lever 6;
d) dismount tie-rod 13 with handle 19, having removed cotter pin 29 and washer 26;
e) dismount valve 7 and plate 12,to which it is fastened, having unscrewed two bolts 25 with washes 31.

### 4.13.2 Adustment of PTO

**Note**: Make adjustment of PTO control in special workshop**.**

**During subsequent assembly:**

a) during factory assembly or repair eccentric axle 5 (Figure 4.209) is installed in extreme right position (the flat is vertically on the right side) and fastened with locking plate 3 and bolt 4;

b) install lever 1 in neutral position, having aligned openings in lever and rear axle body by means of rod 8 mm in diameter, or bolt (2) M10x60;

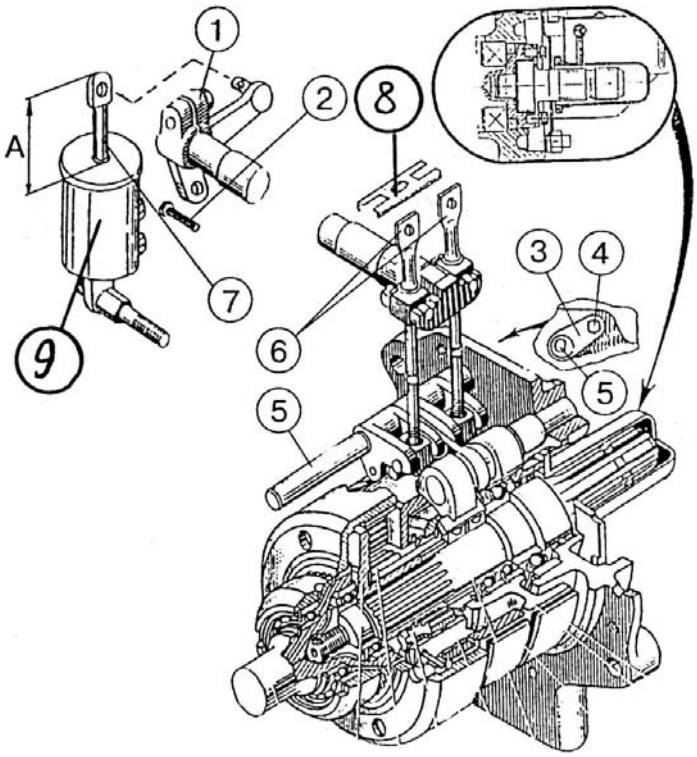
c) unpin and remove locking plate 8;

d) torque adjustment screws (6) to 10 N·m. (1 kgf·m) and then unscrew by 1.5…2 turns (access to screw through hatch in rear axle cover), and then turn screws to the nearest side, so that heads of screws were parallel to longitudinal axis of tractor;

e) when PTO is correctly adjusted, extention of rod 7 against cover of cylinder (dimension “A”) with diesel operational, must be:

1) in position “PTO off” (rod is drawn is) – within $46 \pm 3$ mm;

2) in position “PTO on” (rod is extended) – within $66 \pm 3$ mm.




1 – lever; 2 – technological bolt; 3 – locking plate; 4 – bolt; 5 – eccentric axle; 6 – adjustment screws; 7 – rod; 8 – locking plate; 9 – hydraulic cylinder.

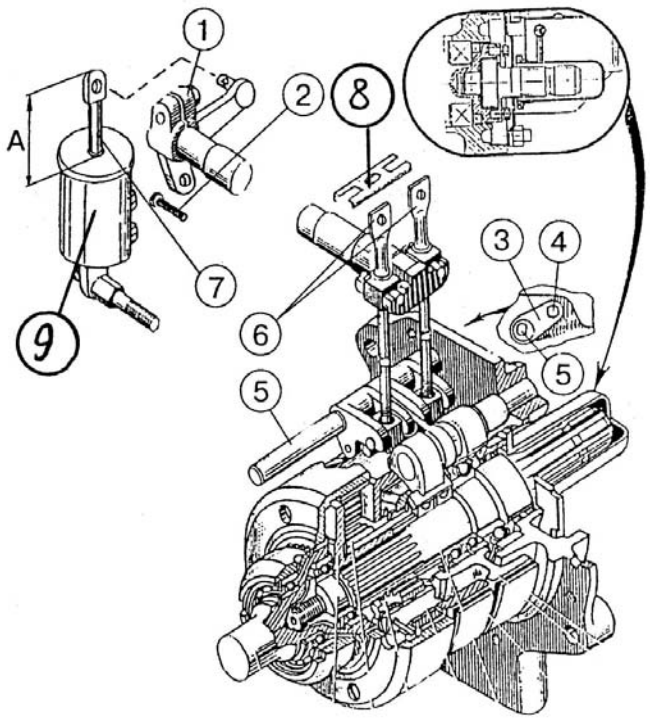
**Figure 4.209**

**Make adjustment of PTO brake bands during tractor operations in the following cases:**

a) PTO slips;
b) value of dimension “A” (Figure 4.210) in position “PTO off” (rod is drawn in) is less than 38 mm, or in position “PTO on” (rod is extended) is over 74 mm.

**External readjustment procedure:**

If gaps in band brakes are adjusted, still PTO doesn’t transfer full moment; it means adjustment margin is exhausted (substantial wear of brake bands’ lining).
In this case:
a) dismount locking plate 10;
b) unscrew screws 6 (Figure 4.210) by 5…7 turns, turn eccentric shaft (5) of the external adjustment mechanism by 180° and secure with locking plate 10 and bolt 9.
Make adjustment of brake bands’ gaps anew.
If fault is not eliminated, replace bands of PTO.



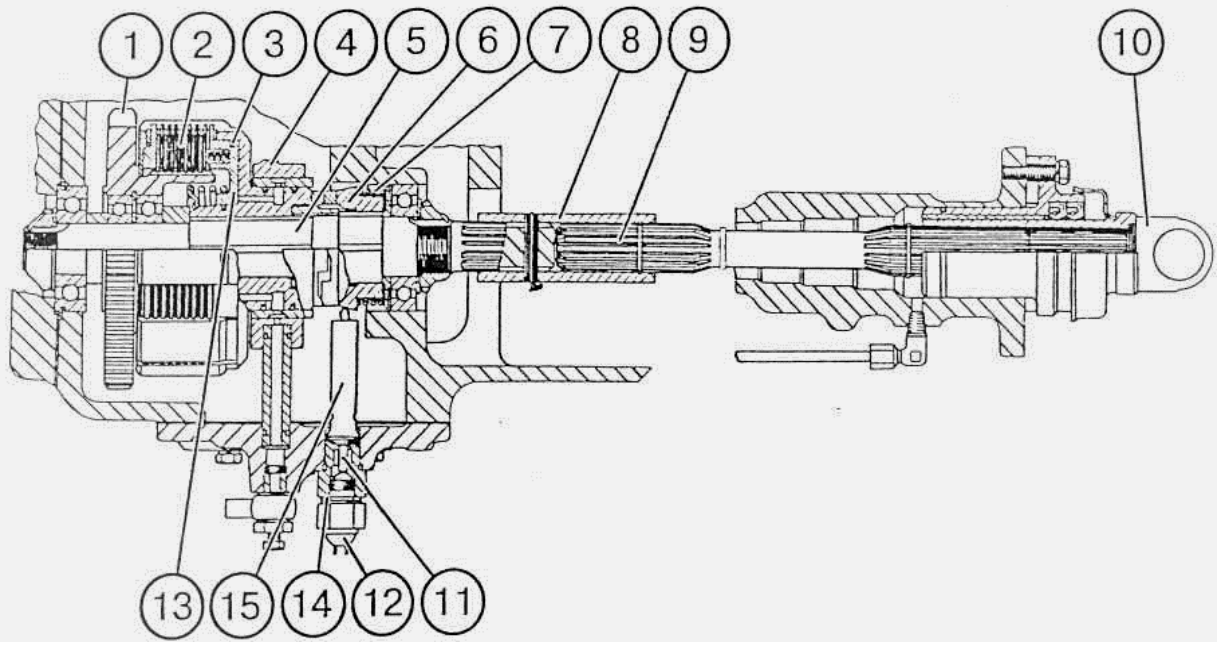

1 – lever; 2 – technological bolt; 3 – locking plate; 4 – bolt; 5 – eccentric axle; 6 – adjustment screws; 7 – rod; 8 – locking plate; 9 – hydraulic cylinder

**Figure 4.210**

## 5 FRONT DRIVING AXLE (FDA)

### 5.1 Drive of front driving axle

FDA drive is designed for transfer of torque from gear box to FDA. It includes reduction gear with multi-disk friction hydraulically driven clutch, torsion, cardan shaft and drive control system. Drive friction clutch is located inside GB body on the right side of tractor movement.




1 - gear; 2 – stack of friction disks; 3 - drum; 4 - shell; 5 - shaft; 6 – half-clutch; 7 - spring; 8 - bushing; 9 - torsion; 10 - yoke; 11 - pusher; 12 - switch; 13 - piston; 14 – switch spacer (12); 15 - guide.

**Figure 5.1**

Drive reduction gear consists of shaft 5 mounted inside GB body on ball bearingax 5. On the shaft freely rotates (with drive disengaged) gear 1 which in permanent engagement with gear of synchronous PTO drive, (Figure 5.1). When clutch is engaged disks 2 are squeezed by piston 13 under oil pressure and connect gear 1 with drum 3 of hydraulically pressed clutch as one unit. Drum 3 and knucle half-clutch 6 of free travel mechanism are mounted on splines of shaft 5, with splined connection allowing the drum to turn against shaft by 45°. Half-clutch 6 is permanently squeezed to knuckles of drum 3 by spring 7 and can axially move, affecting pusher 11 of automatic engagement switch 12. For adjustment of switch 12 spacers 14 installed between switch 12 and guide 15 are provided. Torsion 9 passes through clutch body and connects splined bushing 8 of shaft 5 with sliding yoke 10 of cardan shaft.

.

**When tractor travels forward without slippage** shaft (5), connected to FDA wheels, has greater rotation speed than gear (1) and drum (3), connected to gear (1) via stack of disks (2), turns against shaft (5). Knuckles of drum (3) move half-clutch across splines of shaft (5) in axial direction, squeezing spring (7). In this case contacts of switch (12) are open and distributor electromagnet is disconnected from electric circuit, and there is no pressure in friction clutch booster.

**When slippage of rear wheels exceeds set value** speed of shaft (5) rotation equalizes with speed of gear (1) rotation, and drum (3) turns in reverse direction, spring (7) returns half-clutch (6) to initial position. With its conical section half-clutch moves pusher (11), switch (12) closes electric circuit of distributor electromagnet, oil under pressure is supplied to clutch booster, moving piston (13).

Thus stack of disks is squeezed, locking gear (1), drum (3) and providing transfer of torque. When FDA is rnaged by force oil is supplied to booster regardless of rear wheels slippage. With FDA disengaged electrical-hydraulic distributor shuts off pressure channel, and oil is directed from booster to drain. FDA drive clutch is disengaged.

### 5.1.1 Disassembly of FDA drive

a) remove guarding of the cardan shaft of FDA drive;

b) dismount cardan shaft;

c) screw in threaded opening “A” (Figure 5.2) in the end face of torsion (1) the extractor or 150 – 200 mm long bolt M10 together with ring;

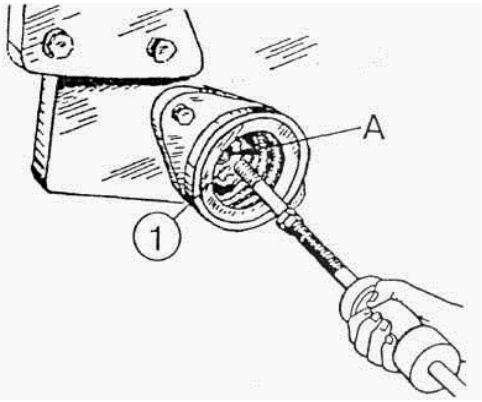



**Figure 5.2**

d) dismount clutch of FDA drive (make it with dismounted and disassemlied gear box without dismantling shaft of reduced gears and back travel), and to do this:

1) via right-side window of GB body dismount bushing (1) (Figure 5.3) with sealing rings 2.

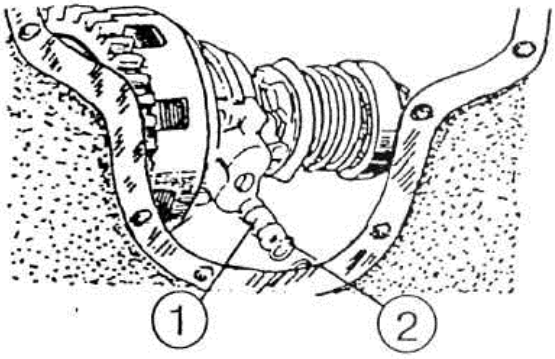



**Figure 5.3**

2) unstake corbel of nut (2) (figure 5.4), fix shaft (1) to prevent rotation, unscrew nut (2) and remove locking washer 3;

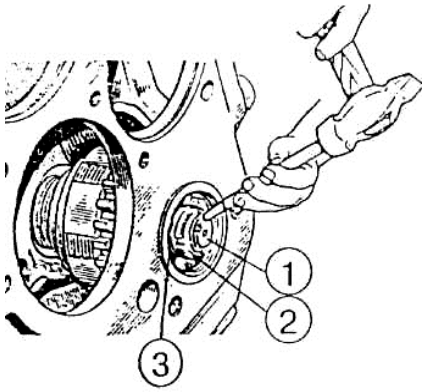



**Figure 5.4**

3) using spacer made of soft metal (brass, etc.), knock out shaft (1) (figure 5.5) as an assembly forward in tractor movement direction;

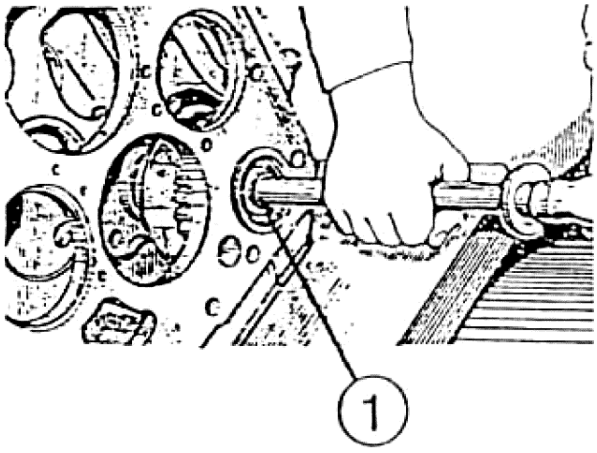



**Figure 5.5**

4) pull hydraulically squeezed clutch (1) out of GB body, (figure 5.6), as an assembly with gear 2;

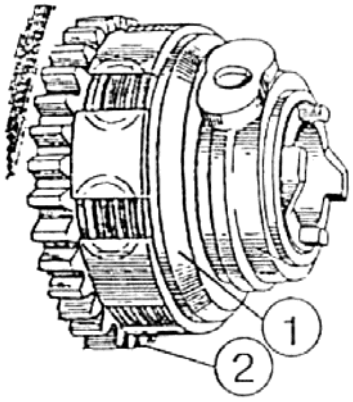



**Figure 5.6**

5 press out of gear box body bearing (2) (figure 5.7) and bushing (1) back as tractor travels;

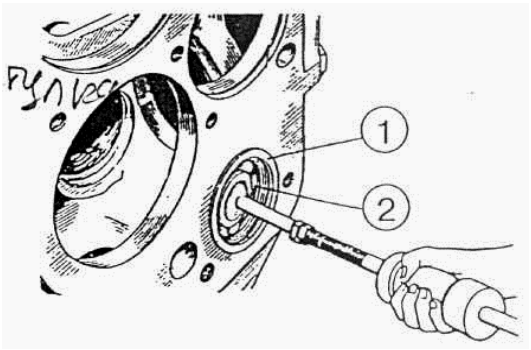



**Figure 5.7**

6) dismount from shaft (3) (**figure 5.56**) bushing (1), half-clutch (2), spring 4;
7) take off safety wire (11), knock out pin (10) and dismount bushing 9;
8) unstake corbel of nut (8) and unscrew it;
9) take off washer 7, bearing 6 and washer 5;

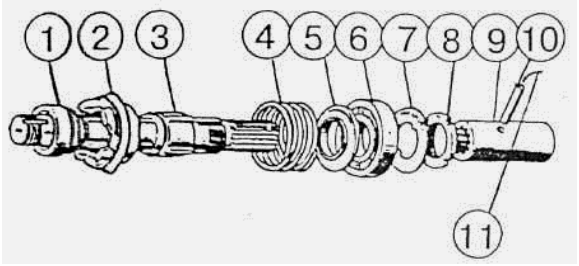



**Figure 5.8**

10) take gear (1) off hydraulically squeezed clutch 2 (Figure 5.9);

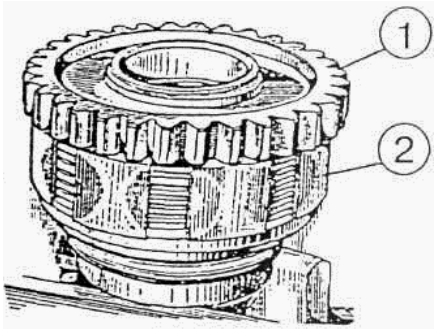



**Figure 5.9**

11) press bearings (1) out of gear 2 (Figure 5.10);

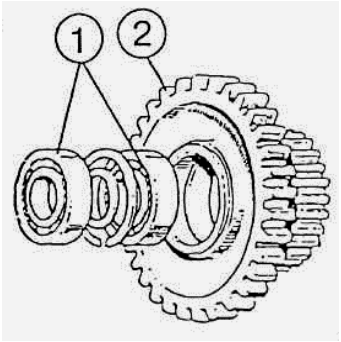



**Figure 5.10**

12) remove locking ring (1), (figure 5.11), and pull out of drum (10) a stack of friction disks (9), guides (6) and springs (7);
13) remove locking ring (3), cup (4) and spring 5;
14) dismount piston (8) with sealing ring (9), pull out of drum (10) shell (12) and sealing rings 11, 13.

Perform assembly in sequence reverse to disassembly.

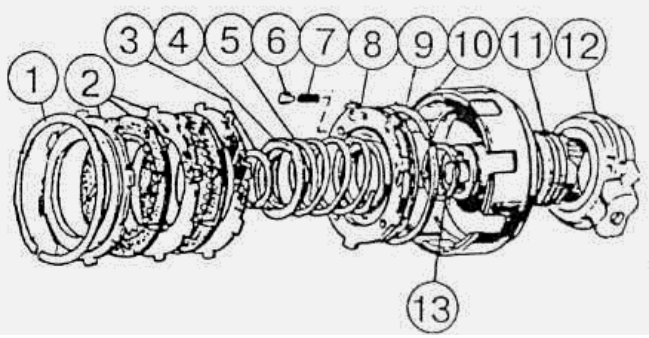



**Figure 5.11**

e) disassembly cardan shaft (Figure 5.12), to do this:

1) remove locking rings (4), avoiding their deformation;
2) press out needle bearings 5;
3) disconnect flange (1) and sliding yoke 6;
4) remove cross-pieces 2;
5) remove end face sealings of cross-pieces 3.

Perform assembly in sequence reverse to disassembly.

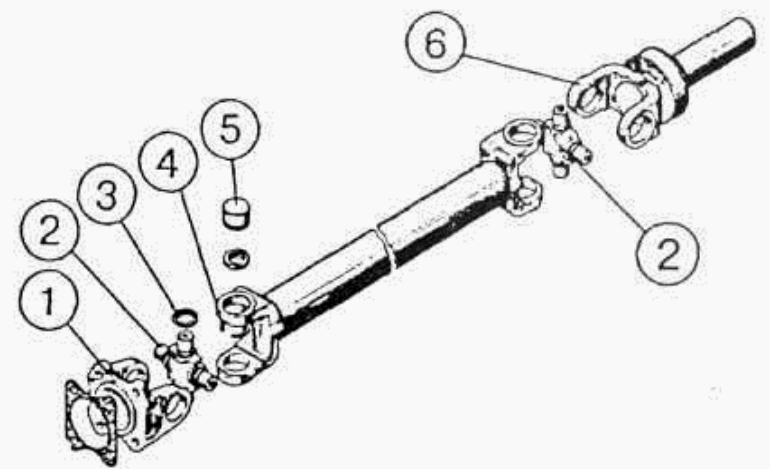



**Figure 5.12**

### 5.1.2 Assembly of FDA drive

Perform assembly in sequence reverse to disassembly, and in doing this:
a) torque nut (1) (figure 5.13) using torque wrench to 80...100 N•m. (8...10 kgf m) and unstake it in shaft grooves;

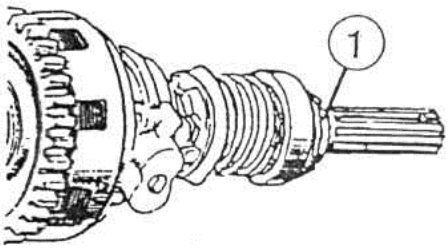



**Figure 5.13**

b) try thickness of friction disks' stack in a way for piston (1) stroke (figure 5.14) to be 0.8..1.2 mm;

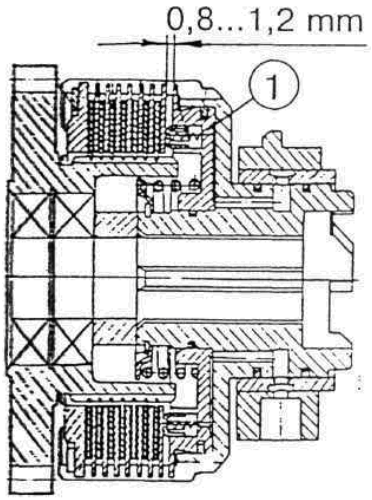



**Figure 5.14**

c) while mounting shaft (3) (figure 5.15) see that its splines were alighed with splines of half-clutch (2) and drum (1).

After clutch is installed in gear box body torque nut (4) to 80... 100 N•m. (8…10 kgf m) and centre-pop in shaft grooves;

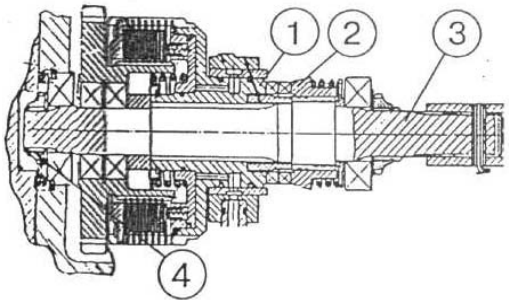



**Figure 5.15**

d) when mounting torsion (2) avoid damaging sealing rings (1) (figure 5.16). Lubricate working edges of sealing rings (1) with grease LITOL-24 or BECHEM LCP-GM;

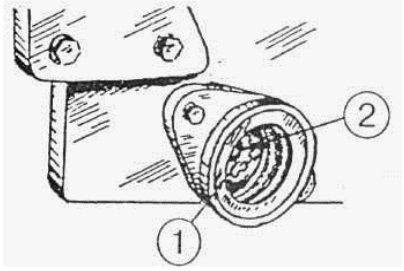



**Figure 5.16**

e) before mounting cardan shaft grease external surface of sliding yoke (1) (figure 5.17) with oil that is filled in transmission body;

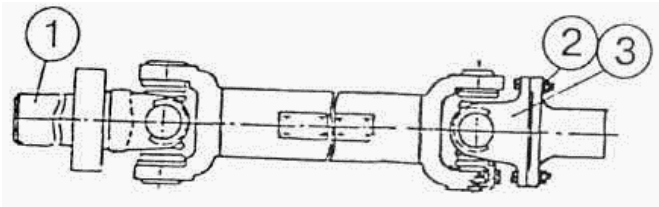



**Figure 5.17**

f) torque nuts (2) for fastening flange (3) of cardanshaft to 35...45 N·m. (3.5…4.5 kgf m);

g) to install cover (2) on transmission (2) (figure 5.18) as an assembly, unscrew plug (3) and align bushing (1) with cover opening using rod of 5...6 mm;

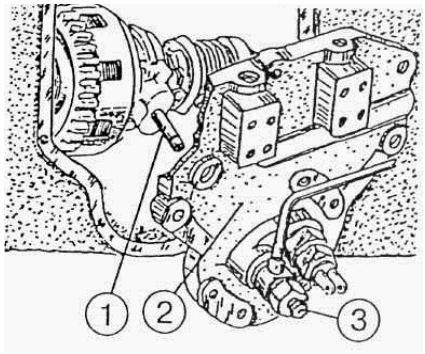



**Figure 5.18**

h) when assembling cardan shaft cross-pieces and before pressing-in needle bearings (1), fill them in with consistent grease No 158 (figure 5.19);

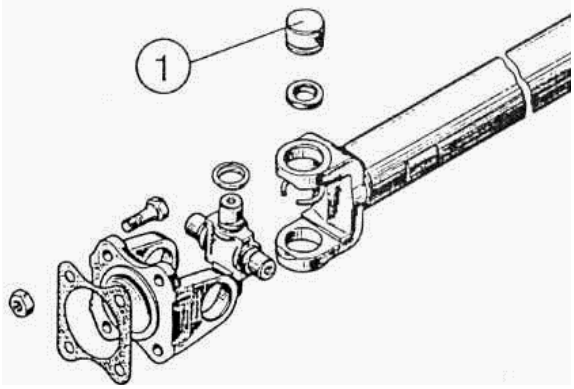



**Figure 5.19**

j) cardan shaft as an assembly must be balanced on the dynamic balancing test bench. Unbalance of 55 g cm is allowed.

### 5.1.3 Adjustment and tesing FDA drive

**Adjusting free travel of the stack of disks of hydraulically squeezed clutch**

Measure free travel “A” (figure 5.20) of the stack. If free travel exceeds allowable value add one driven disk or replace stack of disks.

| | | |
|---|---|---|
| Free travel “A” of the stack of disks of the hydraulically squeezed clutch, mm | Nominal value | 0.8..4.0 |
| | Extreme value | 5.7 |

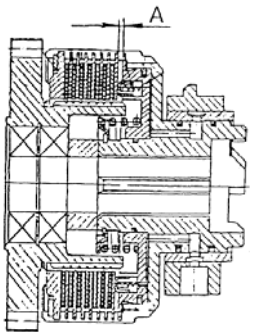
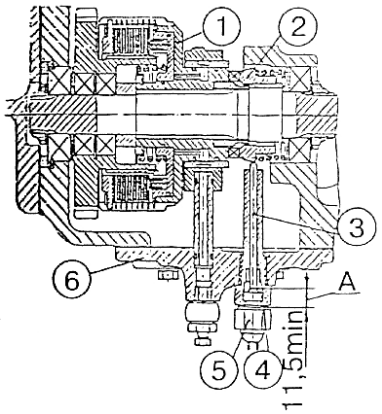



**Figure 5.20**

**Adjustment of switch of the automatic mode sensor**

Make adjustment after assembly of the hydraulically squeezed clutch and installation of cover (6) on transmission in the following order:

1) put drum (1) in position «**I**», (figure 5.21), when knuckles of half-clutch (2) and drum (1) are fully brought together, pusher (3) is extended outwards to extreme position;



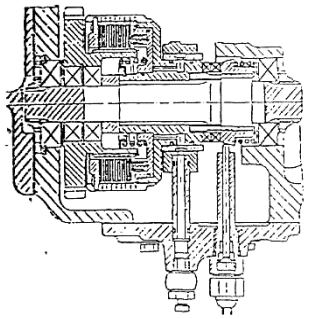

Position “**I**” (clutch is engaged)

**Figure 5.21**

b) put under end face of switch (5), (figure 5.21) initial number (5-6 pcs) of adjusting shims (4);

c) by removing one adjusting shim after another, obtain such position of switch when its contacts are closed;

d) put half-clutch to position "**II**", when knuckles of halg-clutch and drum are fully taken apart and pusher is recessed in extreme position;



Position "**II"** (clutch is disengaged)

**Figure 5.22**

e) check opening of switch contacts in position "**II**".

**Note:** In position «I», dimension «A» between end faces of pusher and switch should be at least 11.5 mm (figure 5.21). Failure to observe this requirement can lead to switch damage.

Switch is considered to be correctly adjusted, if in position «**I**» its contacts are closed, and in position "**II**" they are open. Make verification by control lamp. The check is allowed to be made by signaling device on the control panel, with key of FDA drive control being in the middle position.

**Testing hydraulically squeezed clutch**

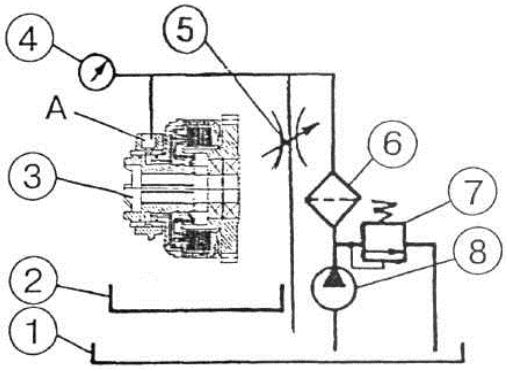
a) to opening "A" (figure 5.23) of hydraulically squeezed clutch shell connect pipeline of the test bench for measuring leakage of operation fluid;

b switch on the test bench;

c) check hydraulically squeezed clutch for value of allowable leakage at operation fluid pressure of $0.9^{+0.1}$ MPa (9+1 kgf/cm$^2$) within 1 min;

d) if leakage of operation fluid exceeds allowable value, replace sealing rings or mating parts of hydraulically squeezed clutch.

| | | |
|---|---|---|
| Leakage value across sealings of hydraulically squeezed clutch, l/min | Nominal value | 1.3 |
| | Extreme value | 2.5 |




1 – oil tank; 2 – metering vessel; 3 - hydraulically squeezed clutch; 4 – pressure gauge; 5 - throttle; 6 - filter; 7 – safety valve; 8 – oil pump

**Figure 5.23**

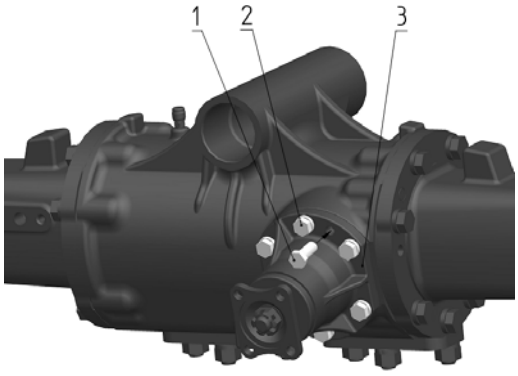
## 5.2 Disassembly of FDA with planetary-cylindrical reduction gears

### 5.2.1 Disassembly of FDA final drive

**Dismounting and disassembly of driving gear of the final drive:**

a) unscrew bolts 2 for fastening final drive body 3;

b) screw two disassembly bolts (1) in threaded openings of body and dismount driving gear as an assembly (Figure 5.24);




1 – disassembly bolt; 2 – bolt; 3 – body of final drive driving gear.

**Figure 5.24**

c) pull out cotter pin 12 and unscrew crown nut 11, (Figure 5.25);

d) remove washer 10 and flange 9 of final drive driving gear 1;

e) knock out final drive gear 1 with internal shell of bearing 2 off final drive body 3 using appropriate spacer and hammer, or dismount it by means of extractor;

f) remove plug 8 and extract collars 7 from driving gear body 3;

g) extract oil retaining ring 6, internal shell of bearing 5 and adjusting rings 4.

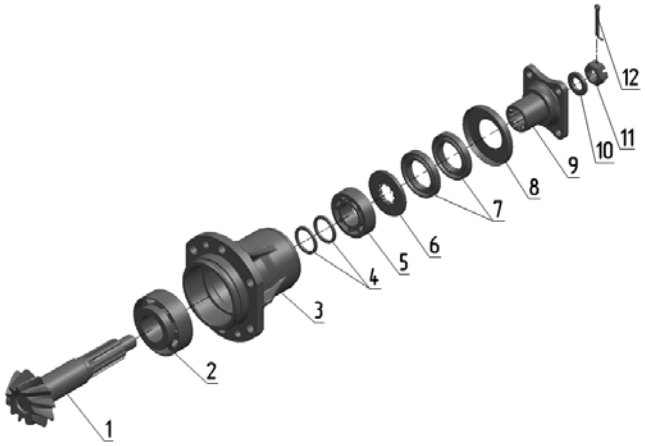
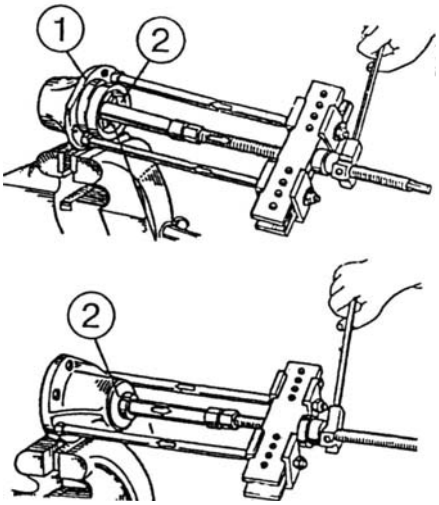



**Figure 5.25**

**To figure 5.25:**

1 – driving gear of the final drive; 2, 5 – conical roller earings;3 – driving gear body; 4 – adjusting rings; 6 – oil retaining ring; 7 – sealing rings; 8 – plug; 9 – flange; 10 – washer; 11 – crown nut; 12 – cotter pin.

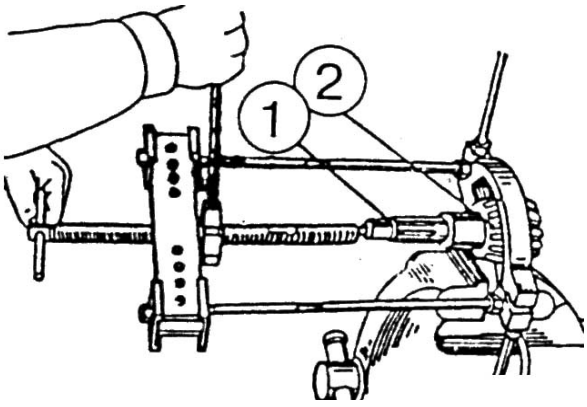
h) using extractors press external shells of conical bearings 2 out of body 1, (Figure 5.26).




1 – body; 2 – external shells of bearings

**Figure 5.26**

j) press internal shell of conical roller bearing 2 off the shaft of final drive driving gear 1 using extractor, (Figure 5.27).



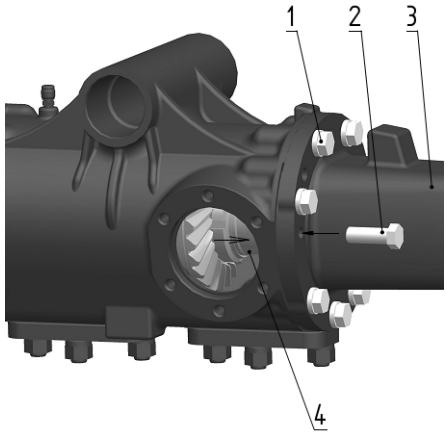

1 – driving gear shaft; 2 – internal shell of bearing

**Figure 5.27**

**Dismounting and disassembly of differential:**

a) unscrew bolts (1) that fastens right-side cover (3) to FDA body, screw disassembly bolts (2) in threaded cover openings and disconnect cover;

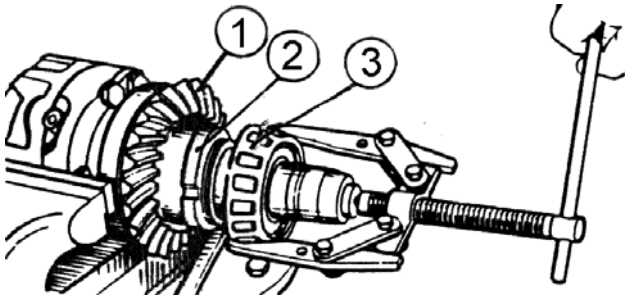
b) pull differential as an assembly (4) out of FDA body;




1- bolt; 2 – disassembly bolt; 3- cover; 4 - differential

**Figure 5.28**

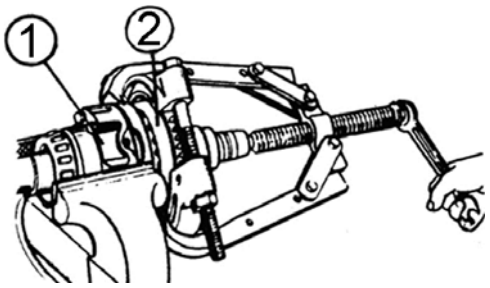
c) using extractor press off internal shells of conical roller bearings 3.
d) unlock and unscrew nut 2, (Figure 5.29).




1 – differential as an assembly; 2 – nut; 3 – bearing

**Figure 5.29**

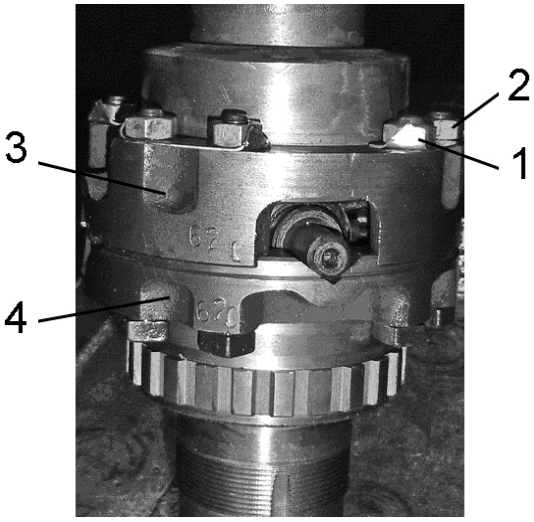
e) using special extractor press driven conical gear (2) off differential body as an assembly 1, (Figure 5.30).




1 – differential as an assembly; 2 – driven conical gear

**Figure 5.30**

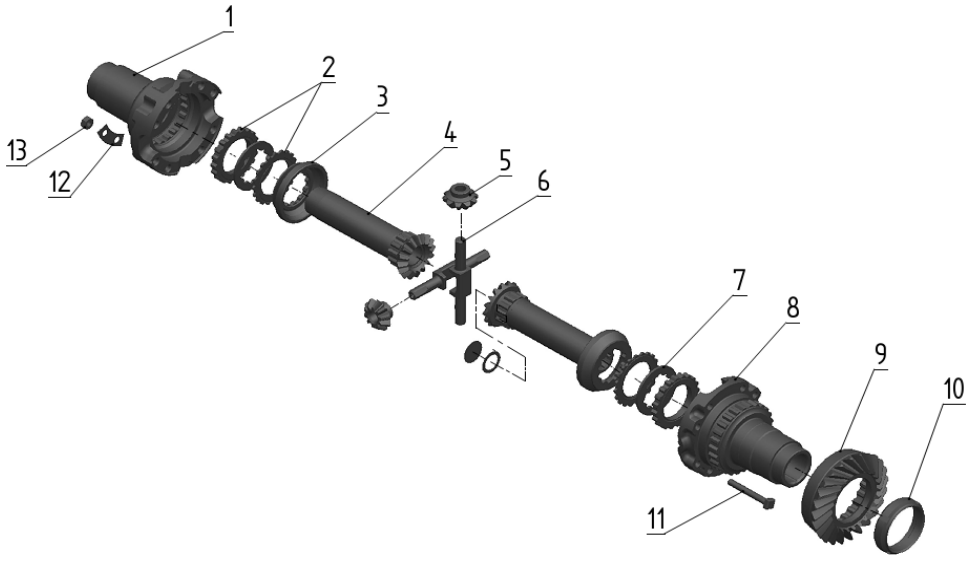
f) unbend locking plates (1), unscrew nuts (2) and take differential boxes apart 3 and 4, (Figure 5.31).




1 – locking plate; 2 – nut; 3, 4 – differential box.

**Figure 5.31**

g) remove satellites' axles (6) together with satellites 5, (Figure 5.32);
h) pull out of boxes (1) and (8) half-axle gears (4), pressure cups (3), drive disks (2) and driven disks (7).




1, 8 – differential boxes; 2 – drive disks; 3 – pressure cup; 4 – half-axle gear; 5 – satellite; 6 – satellite axle; 7 – driven disk; 9 – final drive driven; 10 – nut; 11 – bolt; 12 – locking plate; 13 – nut.

**Figure 5.32**

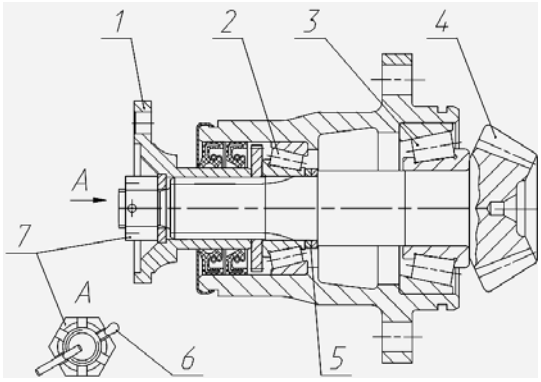
### 5.2.2 Assembly and adjustment operations

a) adjust pretension in bearings 2, 3 of final drive driving gear 4, which must nor exceed 0.04 mm (Figure 5.33).

Adjust tension by grinding oone one adjusting rings 5 and tightening crown nut 7.

b) torque crown nut 7 to 120…150 N m. by turning gear 4 by flange 1, so that rollers of bearings occupied correct position in shells. Cotter pin the nut as shown in (figure 5.33).

If bearings are adjusted correctly moment of resistance to gear rotation should be in the range 0.6…2.0 N m.

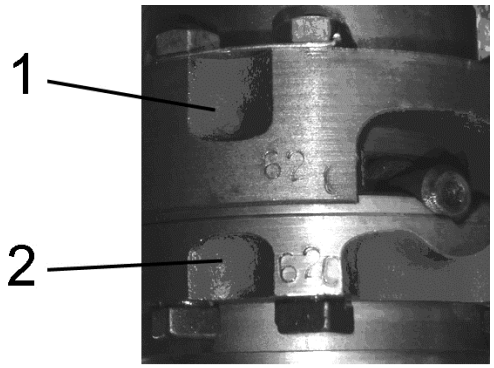



1 – flange; 2, 3 – conical roller bearings; 4 – drive gear of final drive; 5 – adjustment shims; 6 – cotter pin; 7 – crown nut

**Figure 5.33**

c) assembly differential of FDA in sequence reverse to disassembly. Align boxes 1, 2 of differential so that marks on boxes matched. (For example “62”), (Figure 5.34).

d) torque nuts for fastening cover to differential body (FDA) to 115…145 N•m and lock them with locking plate 12, (Figure 5.32).




1, 2– box of differential of FDA

**Figure 5.34**

e) mount differential 5 with conical roller bearingами 6 inside body 3 of FDA, (Figure 5.35).

f) put set pf spacers 2 with total thickness 2.0…2.5 mm on the right side between FDA body 3 and sleeve 9.

g) check and, if necessary, adjust dimension 40.7±0.15 mm from final drive axle to surface "**A**" of differential.

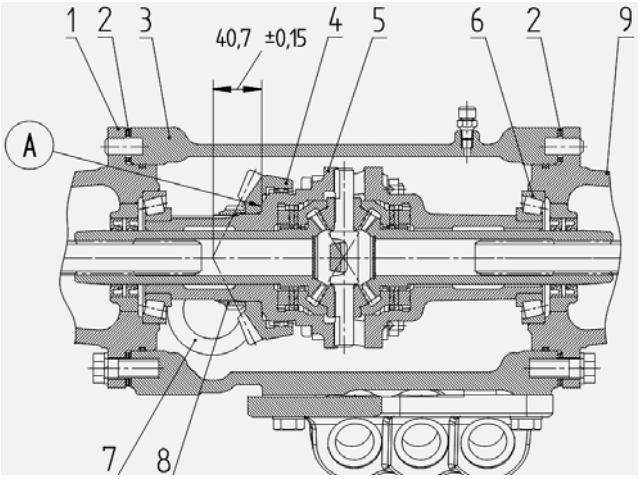
To adjust dimension change the stack of spacers 2 on the right side. After adjusting the dimension pull differential out of body 3 and put on it gear 4, torque nut 8 to 125…155 N m. To lock nut 8, put its tendril in the differential box groove.

h) put differential inside body 3 and adjust pretension in bearings 6, which should not exceed 0.10 mm.

To adjust tension change stack of spacers 2 on the left side.

When tightening bolts for fastening sleeves 1, 9 to body of FDA 3 turn through differential body 5 so that rollers of bearings occupied correct position in shells of bearings.

When adjustment was made correctly moment fifferential turning should be in the range from 0.6 to 60 N m.




1,9 – cover (sleeve); 2 – adjusting shims; 3 – body of FDA; 4 – driven gear; 5 – differential as an assembly; 6 – conical roller bearing; 7 –driving gear of final drive; 8 – nut

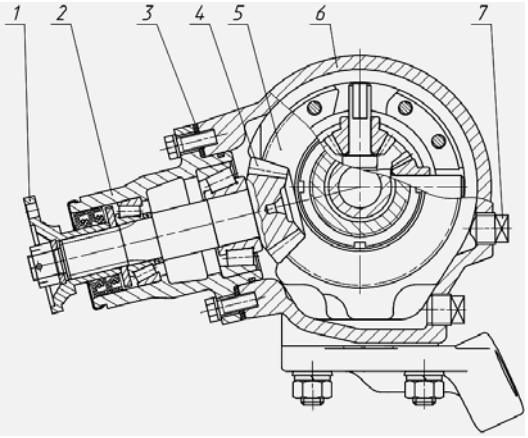
**Figure 5.35**

i) install gear box of final drive 2 inside body 6 of FDA, (Figure 5.36).

j) put required stack of spacers 3 to adjust lateral clearance in the engaged gears of final drive 4, 5.

Clearance should be within 0.18 – 0.46 mm, which corresponds to angular movement of flange 1 (for diameter of bolts position), correspondingly 0.3 – 0.65 mm.

When measuring lateral clearance, lock driven gear 5 against rotation using rod or another tool and opening for filler plug 7 in body 6 of FDA.




1 – flange; 2 – body of final drive gear as an assembly; 2 – stack of spacers; 4 – driving gear of final drive; 5 – driving gear of final drive; 6 – body of FDA; 2 – filler plug.

**Figure 5.36**

**IMPORTANT!** Lateral clearance and tooth contact are adjusted after adjusting pretension of bearings of the gear of final drive and differential (Figure 5.33).

k) make adjustment of gears engagement by tooth contact (table 5.1).

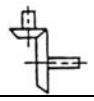
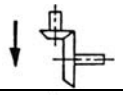
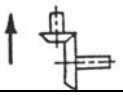
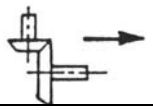
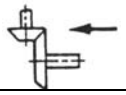
If gears of final drive are correctly adjusted the tooth contact must be as shown in diagram below.

If tooth contact is not correctly located, make adjustment by displacing differential through reinstallation of spacers 2 from under left flange of FDA body under the right-side one, and visa versa, (Figure 5.35), without changing their total number, or by displacement of driving gear of the final drive through changing stack of spacers 2, (Figure 5.36).

Before checking if gears are correctly engaged by tooth contact, put paint on both sides of driven gear, see (Figure 5.37).

**Figure 5.37**

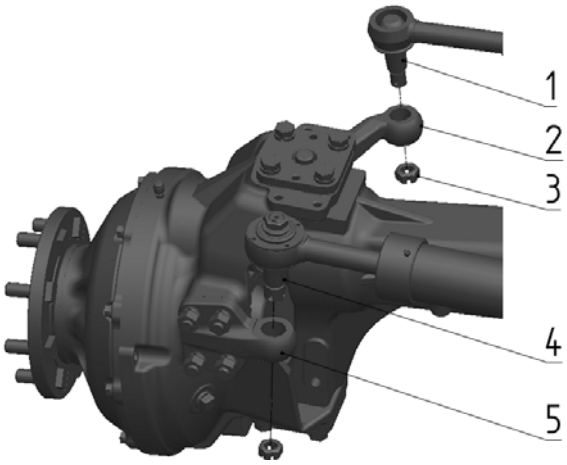
Table 5.1

| Tooth contact on driven gear | How to adjust gears' engagement | Adjustment diagram |
|---|---|---|
|  | Correct gears engagement under small load |  |
|  | Bring driving gear towards the driven one |  |
|  | Shift driving gear aside from the driven one. |  |
|  | Shift driven gear (differential) aside from the driving one |  |
|  | Bring driven gear (differential) closer to driving one |  |

## 5.3 Disassembly of planetary-cylindrical reduction gear

### Dismounting of steering rod and joint of hydraulic cylinder rod

a) unlock and unscrew crown nut 3 (Figure 5.38);
b) press ball pin (1) out of swivel lever (2) and disconnect steering rod;
c) press pin of hydraulic cylinder rod (4) out of arm (5);



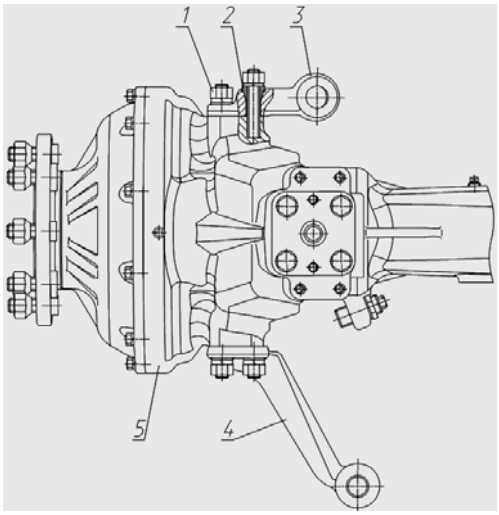

1 – steering rod pin; 2 – swivel lever; 3 – nut; 4 – pin of hydraulic cylinder rod; 5 – arm.

**Figure 5.38**

### Dismounting of swivel lever and arm

To dismount swivel lever (4) and arm for fastening hydraulic cylinder (3) from reduction gear body (5), perform the following operations:

a) unscrew nuts (1) by 3…4 turns;
b) strike lever and arm several times to release cut conical bushings (2) from conical openings;
c) unscrew nuts (1), dismount bushings, lever and arm




1 – nut; 2 – body bushing; 3 – hydraulic cylinder arm; 4 – swivel lever; 5 – reduction gear body.

**Figure 5.39**

**Dismounting of reduction gear**

a) to make dismounting of reduction gear easier, wrap steel rope around reduction gear body, and using lifting mechanism pull the rope to balance mass of reduction gear, (Figure 5.40)

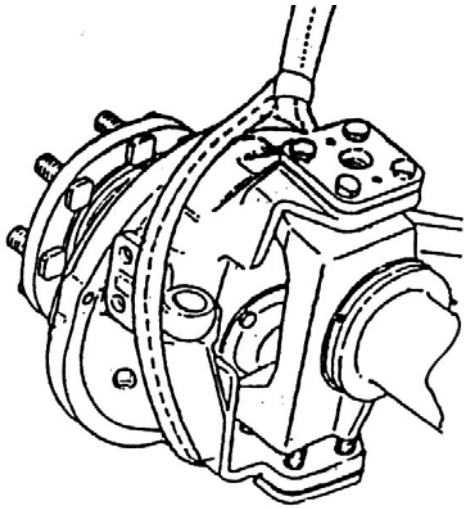
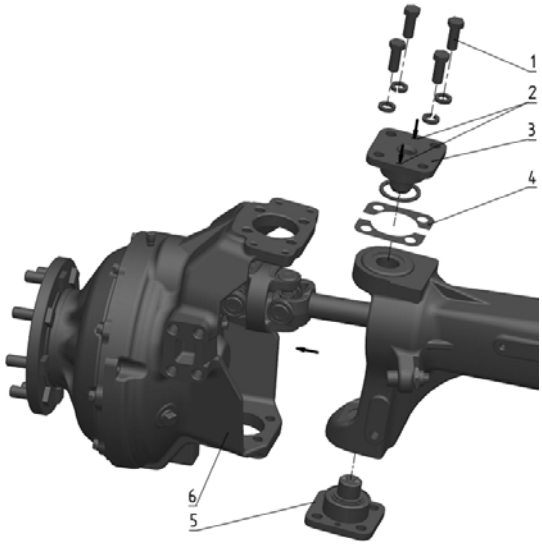


**Figure 5.40**

b) unscrew four bolts (1), screw two disassembly bolts in threaded openings (2) of pivot axle (3) and press upper axle off swivel cam 6;

c) remove spacers 4, (Figure 5.41).

In a similar way press out lower pivot axle 5.



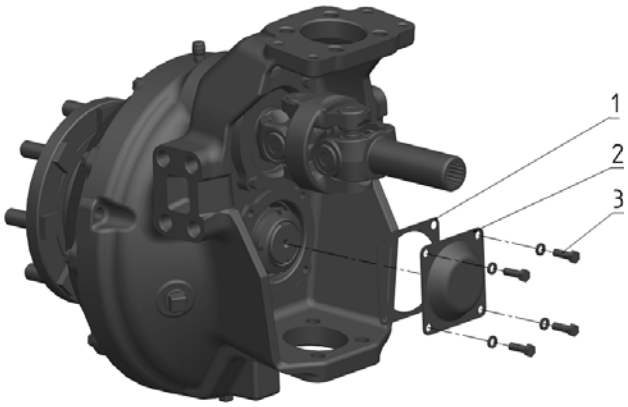

1 – bolt; 2 – disassembly threaded openings; 3 – upper pivot axle; 4 – adjustment spacers; 5 – lower pivot axle; 6 – swivel knuckle.

**Figure 5.41**

**NOTE:** Adjusting shims (4) are installed only under flange of upper swivel axle (3).

**Disassembly of wheel reduction gear**

a) unscrew bolts (3) and remove cover (2) together with spacer 1, (Figure 5.42)



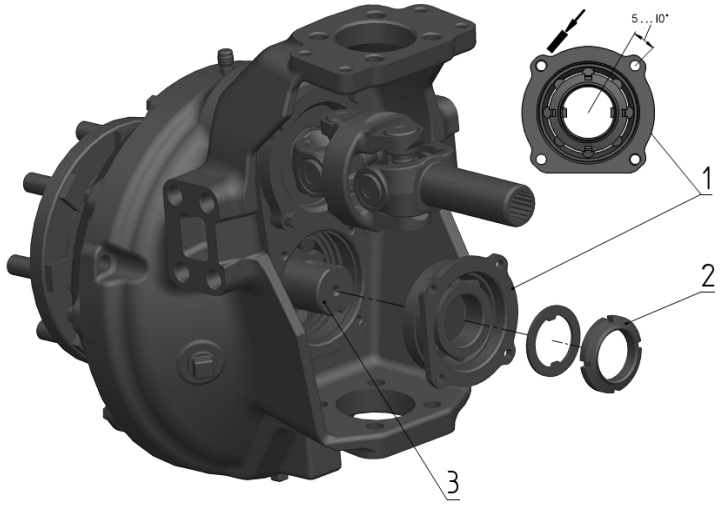

1 – bolt; 2 – cover; 3 – spacer.

.

**Figure 5.42**

b) using special wrench unscrew nut (2), fixed on flange shank (3) by deformation of corbel in the cut of threaded shank.3 using punch and hammer turn cup (1) to angle 5…$10^0$ and screw disassembly bolts M10 in two threaded openings of cup flange. Dismount cup with bearing as an assembly (Figure 5.43).

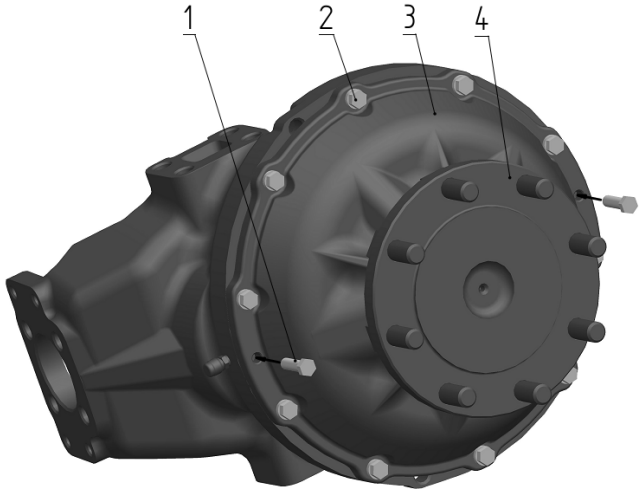
**NOTE:** To fasten cover to cup use bolts M8




1 – cup; 2 – nut; 3 – flange shank

**Figure 5.43**

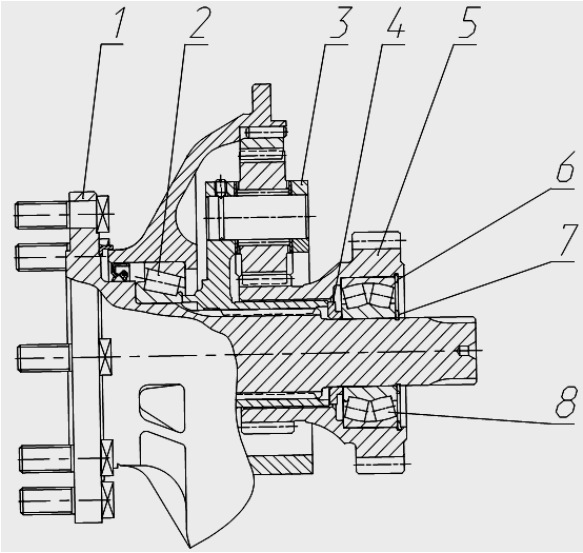
c) unscrew bolts (2) for fastening cover (3). Screw two disassembly bolts (1) in cover threaded openings and dismount cover together with flange (4), (Figure 5.44).




1 – disassembly bolt; 2 – bolt; 3 – cover; 4 – wheel flange

**Figure 5.44**

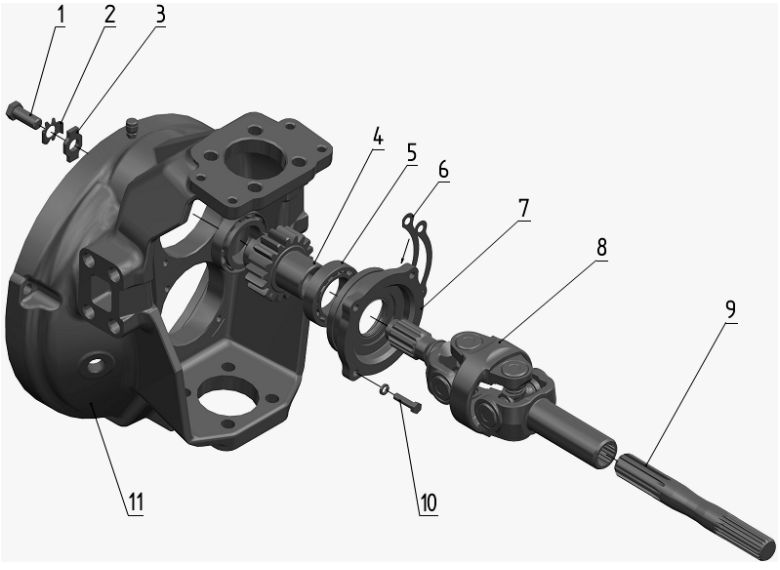
d) remove locking ring (7) and press block gear (5) together with spherical roller bearing (8) off flange (1); remove carrier (3), remove flange (1) together with internal bearing shell (2).Remove distance ring 4, (Figure 5.45)




1 – flange; 2 - bearing; 3 - carrier; 4 – distance ring; 5 – block of gears; 6, 7 – locking rings; 8 – spherical bearing

**Figure 5.45**

e) unbend corners of washer (2) from corner of bolt head (1); unscrew bolt (1) and remove washers (2), (3); remove tandem joint (8) and shaft (9); unscrew bolts (10); while screwing disassembly bolts in threaded openings of cup (7), press out the cup together with sealing ring; remove adjusting shims (6) and keep them as a set; remove drive gear (4) and conical roller bearings 5.

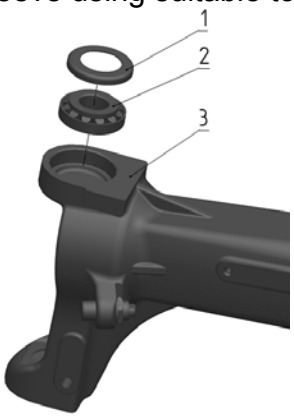



1 – bolt; 2 – bending washer; 3 – washer; 4 – driven gear; 5 – conical bearing; 6 – adjusting shims; 7 – cup; 8 – tandem universal joint; 9 – shaft; 10 – bolt; 11 –swivel knuckle body

**Figure 5.46**

**Dismounting of bearings of pivot axles**

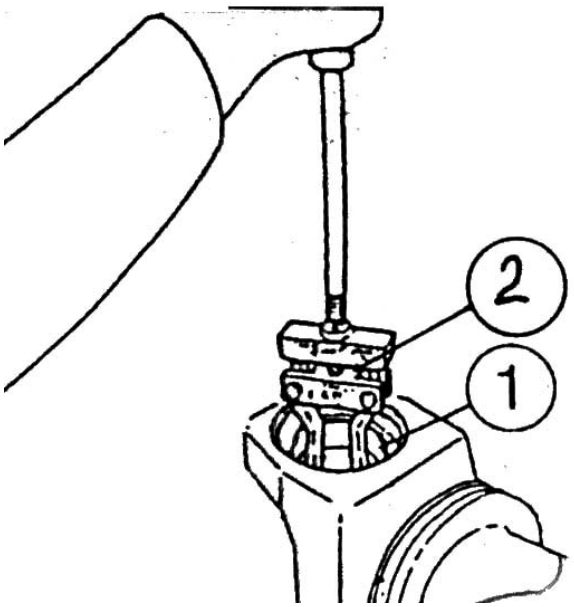
a) pull cup of bearing (1) out of FDA sleeve using suitable tool, (Figure 5.47).




1 – bearing cup; 2 – bearing; 3 – FDA sleeve

**Figure 5.47**

b) using suitable extractor (2) press out of sleeve external shell of conical roller bearing (1), and in a similar way press out lower shell, (Figure 5.48).



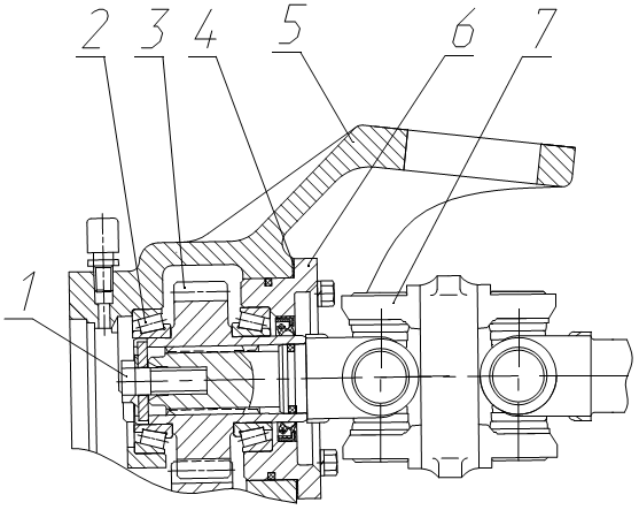

1 – external bearing shell; 2 – extractor

**Figure 5.48**

### 5.4 Assembly and adjustment operations

a) adjust axial play in conical roller bearings (2) of drive cylindrical gear (3) using spacers (4) between cup (6) and body (5). Clearance or tension should not exceed 0.05 mm, (Figure 5.49).

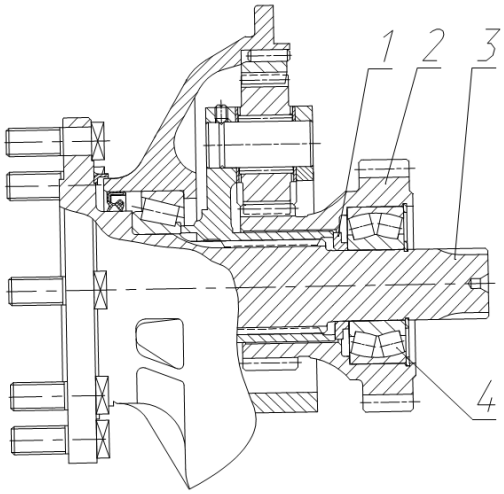
Torque bolt (1) to 120…140 N•m.and lock with bending washer 2, (Figure 5.46)




1 – bolt; 2 – conical roller bearing; 3 – drive gear; 4 – adjusting shims; 5 – body; 6 – cup; 7 – tandem joint.

**Figure 5.49**

b) when installing block gear (2) on flange shaft (3), align ring (1) so that smaller ring diameter faced spherical roller bearing 4, (Figure 5.50).

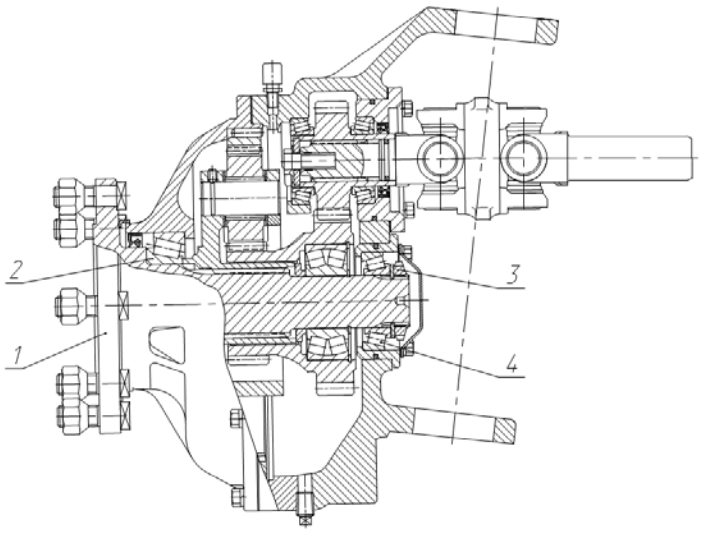



8 - ring; 9 – block gear; 10 – flange shaft; 11 – spherical roller bearing

**Figure 5.50**

c) bearings 2, 4 **(**figure 5.51**)** must be adjusted without clearance, make adjustment by torquing nut (2) to 180…200 N•m. with its subsequent unscrewing by angle 15…20°; during tightening rotate body of wheel reduction gear so that rollers of bearings were correctly positioned in shells. After adjustment lock the nut by deformation of nut gorbel inside the cut of flange shaft.

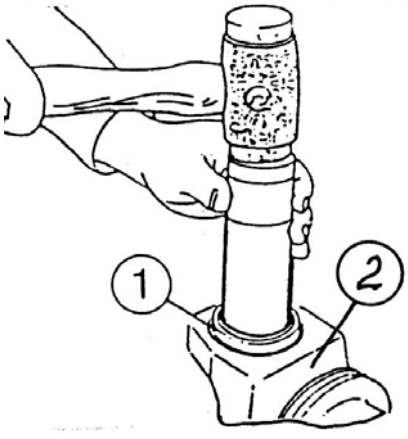
When adjustment of reduction gear bearings is correct, the moment turning through of reduction gear 1 by flange must be in the range from 14 to 40 N·m.




1 – adjustment nut; 2 – conical roller bearing; 3 – flange

**Figure 5.51**

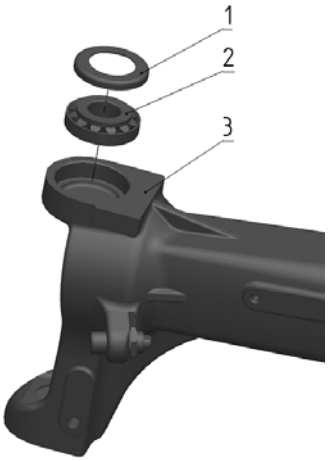
d) when mounting swivel axles of swivel knuckle, press external shells (1) of upper and lower bearings in borings of sleeve (2), using suitable brass or copper plate and hammer, (Figure 5.52);




1 – external shell of conical roller bearing; 2 – half-axle sleeve

**Figure 5.52**

1) put upper and lower bearings 2 and cup of bearing (1) inside half-axle sleeve (3), (Figure 5.53)



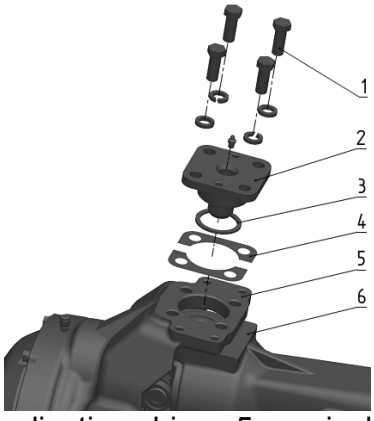

1 – bearing cup; 2 – bearing; 3 – FDA sleeve

**Figure 5.53**

2) match borings in sleeve (6) and body (5) and mount upper axle (3) together with spacers (4) and ring (3) inside opening of bodyand sleeve, having first lubricated sealing ring with grease LITOL-24, (Figure 5.54).

3) screw in bolts (1), without tightening them.mount lower swivel axle without adjusting shims; put and tighten bolts of lower axle;

5) tighten bolts (1) of upper axle (2).

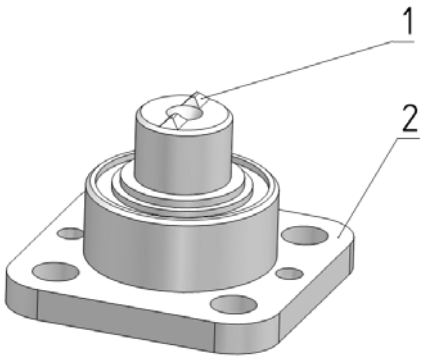



1 – bolt; 2 – pivot axle; 3 – ring; 4 – adjusting shims; 5 – swivel knuckle body; 6 – FDA sleeve.

**Figure 5.54**

6) when mounting left-side lower axle of pivot (2), **(**figure 5.55**)**, align lugs (1) on axle end face so that axis of lugs was parallel to longitudinal axis of FDA. If one of the lugs is worn out,

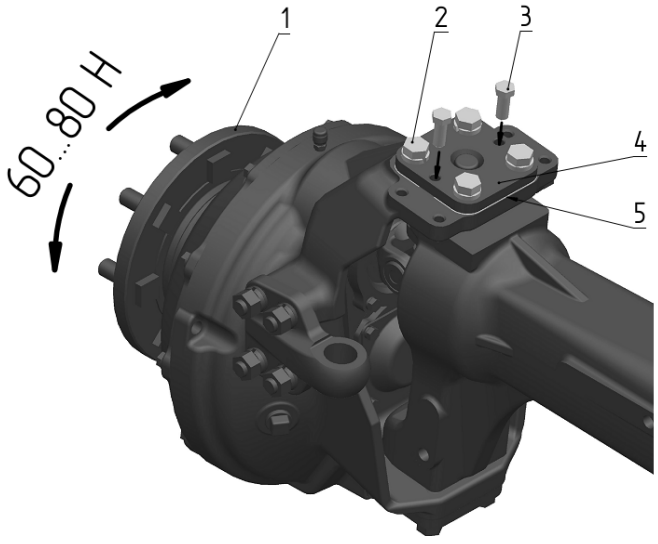
turn axle by $180^0$, so that the second good lug coinsided with axis of pusher, sensor of wheel turning angle.




1 – extension; 2 – bottom left-side axle of pivot

**Figure 5.55**

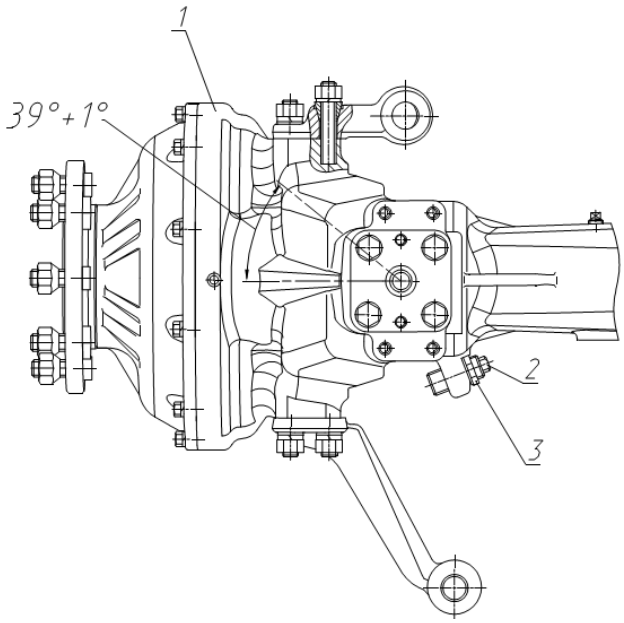
7) Adjust preload in conical roller bearings of pivot axles. Tension is considered correct if effort of knucle turn applied to flange (5), is 60…80 N. If the effort doesn't fit this range, adjust it by means of cut adjusting shims (4) by unscrewing bolts (2) and screwing in disassembly bolts (1) in a way to shift axle upwards and release shims. To increase tension (effort) remove identical number of shims on both sides and visa versa. Tighten fastening bolts (2) to 180…200 N•m. (Figure 5.56)




1 – disassembly bolt; 2 – bolt; 3 – pivot upper axle; 4 – cut adjusting shims; 5 – flange

**Figure 5.56**

e) check and, if necessary, adjust maximum allowable angles of knuckle turn (1), which must be within 39…40$^0$ (figure 5.57) when measured from position corresponding to straight movement. Make adjustment of maximum permissible turn to the left or right by means of adjustment screw (2), which is locked with checknut (3).




1 – swivel knuckle body; 2 – adjustment; 3 – checknut

**Figure 5.57**

## 6 WHEELS AND HUBS

### 6.1 Mounting-dismounting works on wheel dismantled from tractor

Mounting and dismounting tires are dangerous operations, hence they must be carried out only by competent persons who have corresponding professional knowledge and skills, and relevant equipment.

Observe the following major rules when dismounting and mounting wheels:

a) carry out works on specially arranged terrain or inside premises on a platform. **Do not perform tires mounting and dismounting directly on the tractor;**

b) use only serviceable mounting tools for mounting-dismounting. Mounting blades must be free of sharp edges, burrs, rust and mud.

**ATTENTION!** Never use heavy tools (sledge hammers, and so on) that can lead to tire damage during disassembly-assembly.

c) never use faulty defective tires and rims, the rims must be of corresponding size, have no mechanical damages, bends, dented edges and burrs, and be corrosion-free;

d) deformation of flange lips must be corrected by slight strikes against bent place, using spacers to avoid dents. Corroded sections must be cleaned of rust, degreased, primed and painted;

e) tires to be mounted must be clean and dry. Inner tubes and tires kept at temperature below -10°C before bounting must be warmed up inside at temperature about +15°C;

f) to facilitate mounting-dismounting put soapy solution on tire flanges and rim lips. It is forbidden to use for these purposes fats or derivatives of petroleum;

g) put rim on clean surface so that valve opening faced upwards. Put tire on rim so that its lower bead opposite valve opening rested against rim lip, and on the side of valve was in the rim strand;

h) place inner tube inside tire so that to fix valve in the rim opening. Slightly inflate inner tube and then using the mount lift entire lower flange through rim lip.

j) put soapy solution on higher flange and rim lip. Lift section of bead opposite the valve by the lip using the mount, and push it inside strand of deep rim. By slight grips gradually lift entire bead over the rim lip while pressing section of tire already being inside to the strand.

i) put tire on the rim concentrically and start inflation. Keep on inflating until beads of tire take their position. **Air pressure during inflation must be continually controlled and must never exceed 250 kPa.** If beads do not take their position before pressure reaches 250 kPa, release air out of tire and repeat inflation;

k) inflate tire at safe distance from tire or behind special fencing. Length of hose between tire and pressure gauge being under pressure on the rim must be about 5 m

l) when dismounting the tire never try to loosen tire beads, valves, remove control valve and release air out of the tire.

### 6.2 Dismounting rear wheel and hub

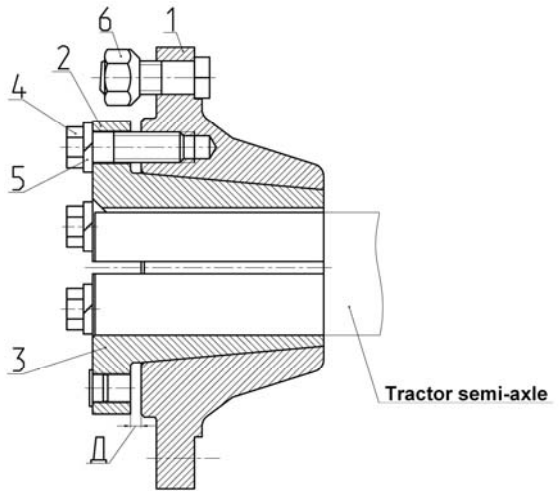
a) put tractor on even ground, having placed stops for front and rear wheels;
b) jack up corresponding sleeve of the half-axle;
c) unscrew eight nuts 6;
d) dismount rear wheel.

#### 6.2.1 Disassembly-assembly of rear wheel hub

a) clean half-axle from mud;
b) unscrew tightening bolts 4 (Figure 6.1) of inserts and screw them inside disassembly threaded openings. If pushing of inserts using disassembly bolts is hampered, pour kerosene or other penetrating fluid in inserts disconnection places, wait for some time and then screw disassembly bolts while knocking at hub body until inserts are extended.
c) dismount hub as an assembly from the half-axle;
d) extract inserts out of hub body.

Make assembly in reverse sequence;
a) install inserts inside hub body;
b) put on bolts 4 washers 5, then screw tightening bolts 4 of inserts inside hub body by several turns;
c) install hub as an assembly on tractor half-axle;
d) torque bolts 4 to from 360 to 450 N m in several tries until all bolts are torques to required moment, keeping clearance «Д» from 5 to 10 mm.

**ATTENTION!** After tightening bolts check that end faces of inserts didn't extend one against another by more than 1…2 mm.




1 – insert, 2 – hub body, 3 – insert, 4 – tightening bolt, 5 – washer, 6 – nut.

**Figure 6.1** – Hub as an assembly

## 7 STEERING

### 7.1 Disassembly-assembly of units of hydrostatic steering controlmounted on tractors BELARUS-1221.2/1221.3/1221.4 with engine MMZ»

**Dismounting HSC oil tank:**

a) unscrew plug 1 (Figure 7.1) and drain oil out of oil tank;
b) disconnect hose 10, having loosened collar 9;
c) having unscrewed valve 14, disconnect oil line 6;
d) having unscrewed three bolts 15, remove tank 7 of hydraulic equipment body;
Mount HSC oil tank on tractor in reverse order

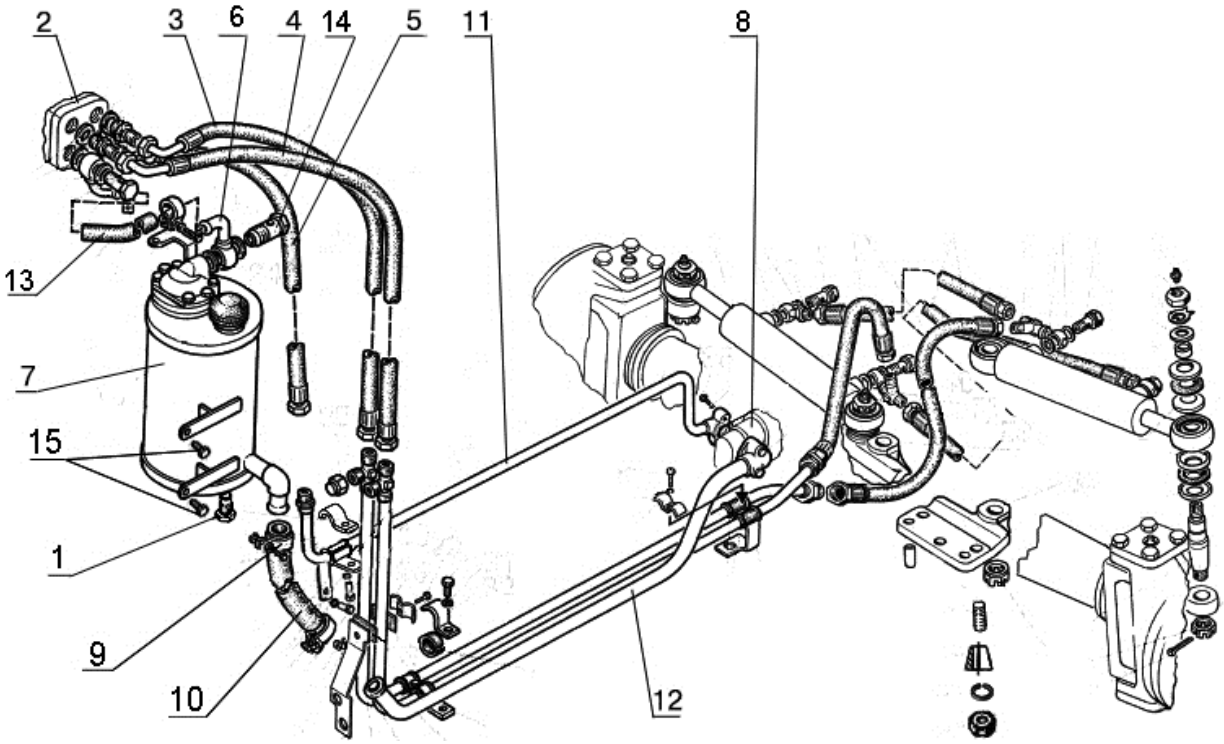
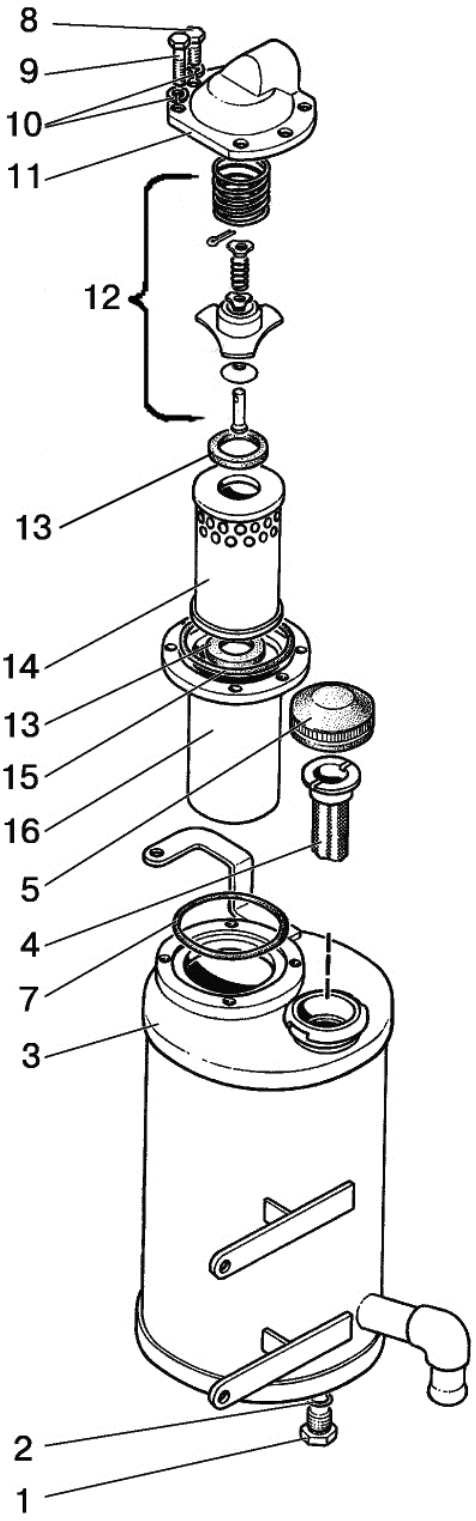



**Figure 7.1**

**Disassembly-assembly of HSC oil tank:**

a) unscrew filler plug 5 (Figure 7.2), pull out meshed filter (4) and wash with diesel fuel
b) unscrew bolts 9 and dismount filter as an assembly;
c) unscrew bolts 8, disconnect filter cover from cup 16;
d) extract filtering element 14;
e) pull out safety valve 12 and wash it in pure diesel fuel;
f) close oil tank openings with plugs or wrap with polyethylene film;
Mount HSC oil tank on tractor in reverse order. Also replace copper rings for new ones.




1 – plug; 2, 7, 13, 15 – ring; 3 – body; 4 – meshed filter; 5 – filler plug; 6 – oil gauge; 8, 9 – bolt; 10 – washer; 11 – cover; 12 – safety valve; 14 – filtering element; 16 – cup.

**Figure 7.2** Oil tank

**Dismounting of metering pump:**

a) disconnect high-pressure sleeves 3, 4, 5 (Figure 7.1) and oil line 13;
b) unscrew four fastening bolts and disconnect metering pump 2;
c) put metering pump in polyethylene bag.
Mount metering pump on tractor in reverse order.

**Disassembly-assembly of metering pump:**

**ATTENTION!** Accounting for extraordinary complexity and responsibility of metering pump from the point of view of steering safety, its disassembly and assembly can be performed only by specialists of the manufacturer's cervice centre (or another authorized service organization), properly trained and qualified in design of metering pump, and well familiar with maintanance and disassemble-assembly manuals, as well as when there are special necessary fixtures, tools and special hydraulic test bench available to provide adjustment and verification of parameters of the metering pump after repair. Otherwise, full responsibility for faulty metering pump rests with a person who disassembles-assembles it, replaces parts or adjusts valves, and also with the tractor owner.

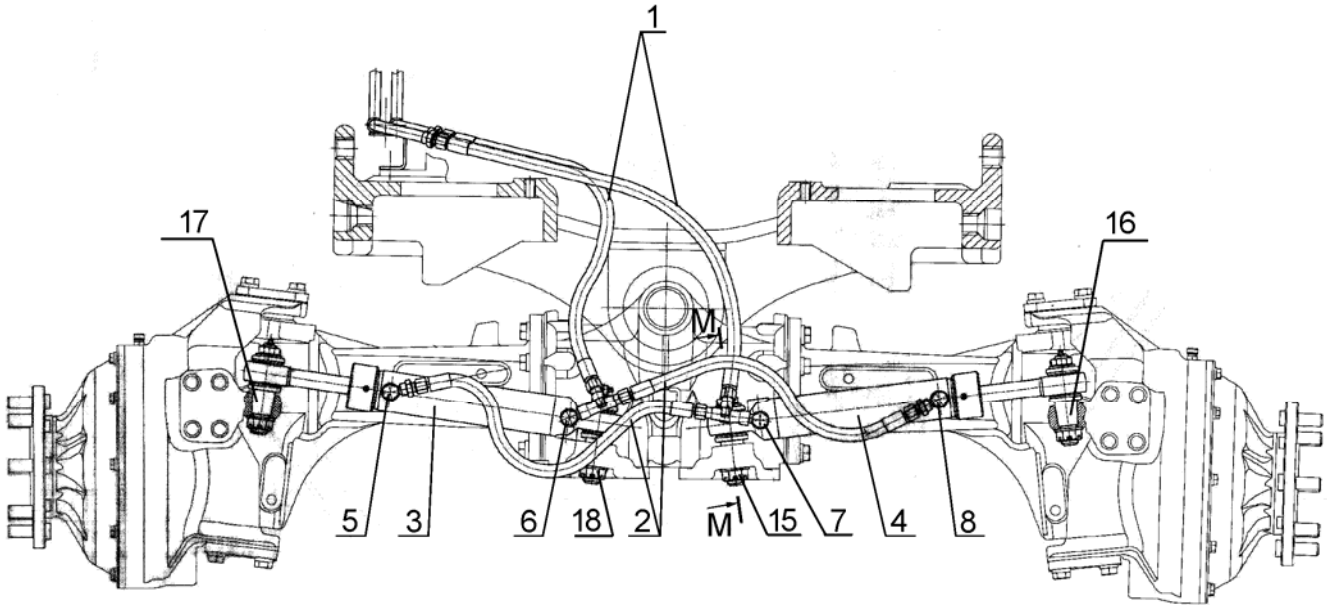
**ATTENTION!** Requirement for disassembly-assembly of metering pumps also pertain to supply pumps.

**Dismounting supply pump:**

a) disconnect oil lines 11, 12 (Figure 7.1), by unscrewing bolts for fastening them to pump, extract rubber rings from oil lines;
b) unscrew four fastening bolts to disconnect supply pump 8;
c) put supply pump in polyethylene bag;
Mount supply pump on tractor in reverse order. Before assembly lubricate rubber rings with grease LITOL-24 according to State Standard GOST 21150-87.

**Dismounting hydraulic cylinders:**

To dismount hydraulic cylinders 3, 4 (Figure 7.3) do the following:
a) unscrew bolts 5, 6, 7, 8, take aside high-pressure sleeves 1, 2;
b) dismount pin 15, and to do this:
1) unbend whiskers of locking washer 9, unscrew nut 10;
2) remove washers 9, 11, cups of sealant 12, sealant of joint 13, spherical bushing 14;
Dismounting pins 16, 17, 18 is similar to pin 15;
c) dismount hydraulic cylinders 3, 4;
d) wrap up outlet openings of hydraulic cylinders 3, 4 with polyethylene film and put the cylinders inside polyethylene bag;
Mount hydraulic cylinders on tractor in reverse order, and replace copper rings for new ones.




**M-M**

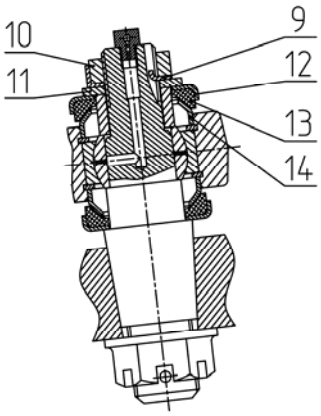



**Figure 7.3**

**Disassembly-assembly of steering hydraulic cylinder:**

a) unscrew screw 9 (Figure 7.4);
b) unscrew cap nut5;
c) pull out of cylinder body 17 rod 2 with piston 4 and front cover 1;
d) unbend locking holes on corbel of nut 3 and unscrew nut;
e) remove piston 4, front cover 1 and cap nut 5.

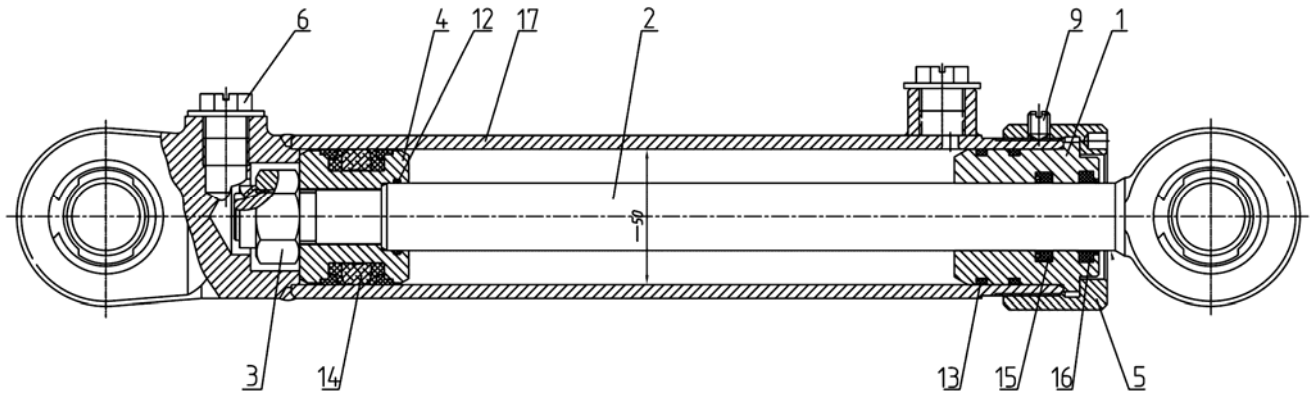



**Figure 7.4** Hydraulic cylinder

**Make assembly of hydraulic cylinder in reverse order:**
a) before assembly lubricate with oil sealing elements 12, 13, 14, 15, 16;
b) put on rod 2 cap nut 5, front cover 1, piston 4;
c) torque nut 5 to 80 N m and lock it (bend gorbel of nut 5 in grooves on rod 2;
d) put preassembled rod (with piston and front cover) inside cylinder body 17;
e) Torque cup nut 5 to 100 N•m. and lock with screw 9.

### 7.1.1 Disassembly-assembly of units of the hydrostatic steering controlmounted on tractors BELARUS-1221.4 with engine Deutz»

Disassembly-assembly of HSC for tractor “BELARUS-1221.4 with engine Deutz” is identical to disassembly-assembly of HSC for tractor “BELARUS-1221.4 with engine MMZ” except for HSC oil tank.

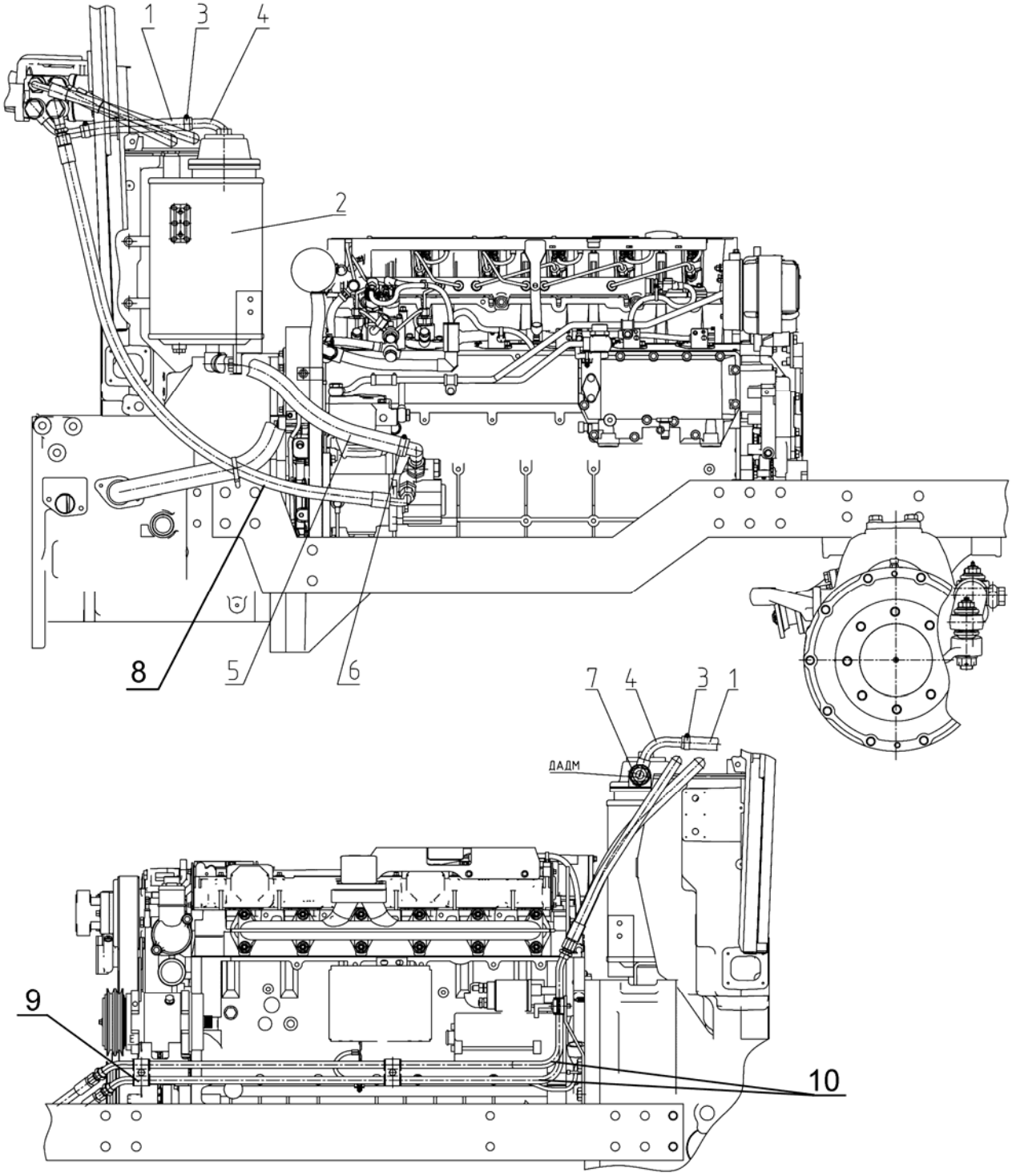



**Figure 7.5 a**

**Disassembly-assembly of HSC oil tank of tractor BELARUS-1221.4 with engine Deutz**

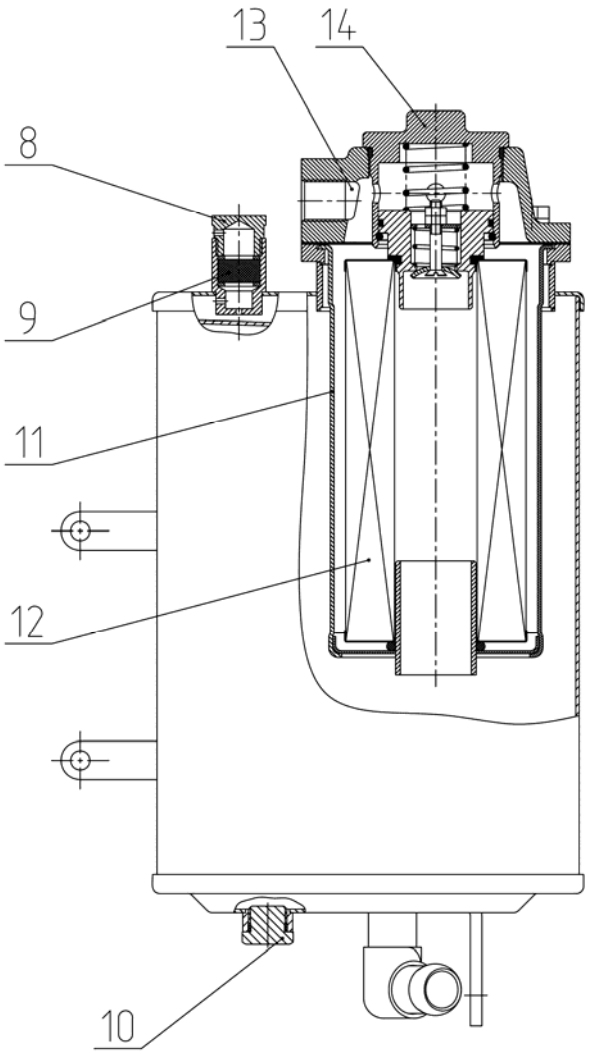



**Figure 7.5 б** HSC tank of tractor “BELARUS-1221.4 Deutz”

a) unscrew drain plug 10 (Figure 7.5 b) of HSC oil tank 2 (Figure 7.5 a) and oil out of it;
b) disconnect hose 1 (Figure 7.5 a), having loosened collar 3;
c) disconnect oil line 4, by unscrewing valve 7;
d) disconnect hose 5, having loosened collar 6;
e) unscrew three fastening bolts and disconnect oil tank 2;
f) unscrew filler plug together with safety valve 14 (Figure 7.5 b), wash it diesel fuel and put back in place;
g) unscrew four bolts for fastening filter cover 13 and remove it;
h) pull out filtering element 12, extract filter body 11 and wash it with pure diesel fuel;
i) install filtering element and assembly filter in reverse order;
j) unscrew plug of breather 8, extract filter 9 and wash it with diesel fuel, then put it back in place and screw up breather’s plug;

k) close oil tank openings with plugs or wrap with polyethylene film;

Mount HSC oil tank on tractor in reverse order.Copper rings of valve 7 (Figure 7.5 a) replace for new ones. Oil is filled in oil tank via filter 12 (Figure 7.5 b) by unscrewing filler plug 14.

### 7.1.2 Disassembly-assembly of units of the hydrostatic steering controlmounted on tractors BELARUS-1221B.2

**Dismounting of metering pump 2:**

a) disconnect high-pressure sleeves 3, 4, 5, 6 (Figure 7.6);

b) unscrew four fastening bolts and disconnect metering pump 2;

c) put metering pump in polyethylene back.

Mount metering pump in reverse order.

**Dismounting of metering pump 1:**

a) disconnect oil lines 18, 19, 20, 21;

b) unscrew four fastening bolts and disconnect metering pump 1;

c) put metering pump in polyethylene back

Mount metering pump on tractor in reverse order, and replace copper rings for new ones.

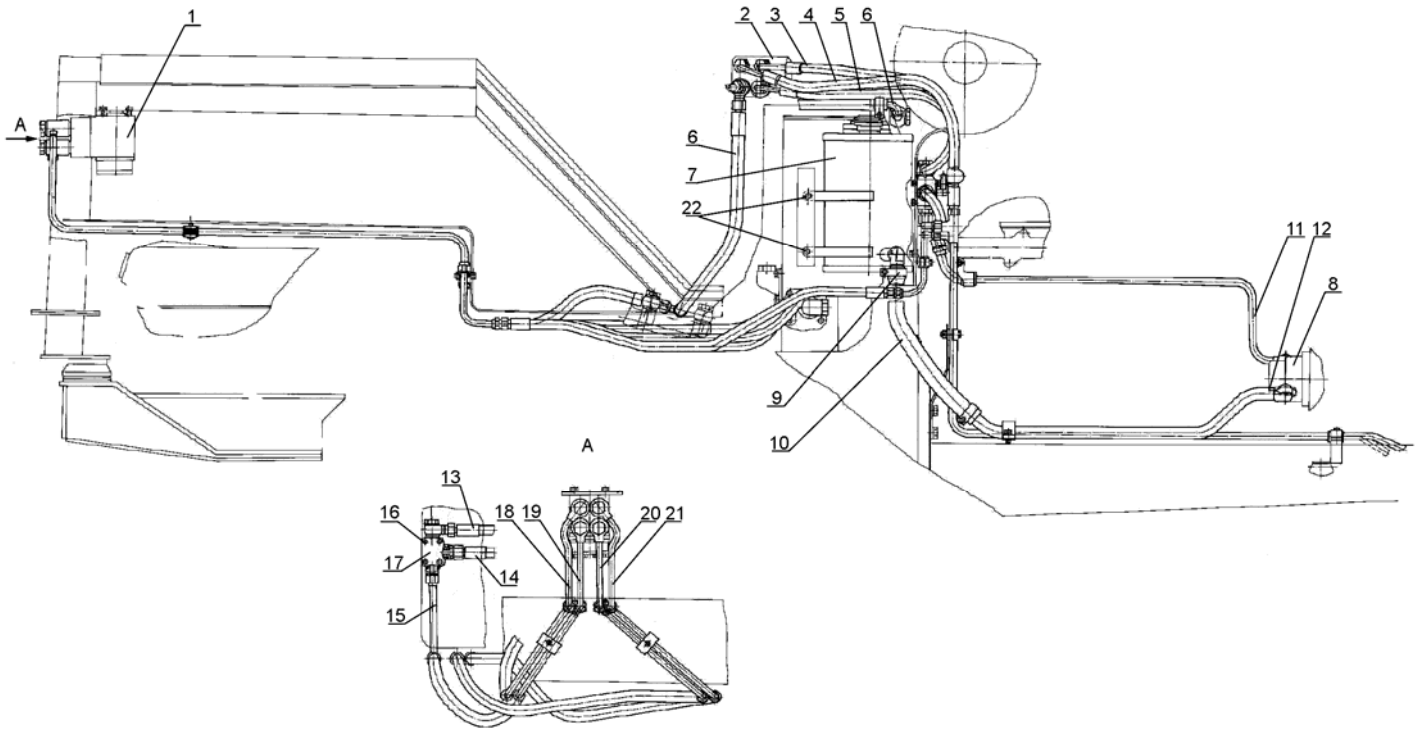



**Figure 7.6**

**Dismounting of reverse valve 17:**

a) dismount valve of reverse 17 (Figure 7.6) from tractor, and to do this:

1) disconnect hydraulic sleeves 13, 14 and oil line 15;

2) unscrew bolts 16 for mounting valve of reverse 17;
3) dismount valve of reverse 17;

**Disassembly-assembly of reverse valve:**

1) having unscrewed locking nut 2 (Figure 7.7), unscrew lever 1 off control valve 5 and remove stopper 3;
2) loosen nuts 7 and unscrew stops 6;
3) having unscrewed screws 8 take stopper 9 out of boring of control valve 5;

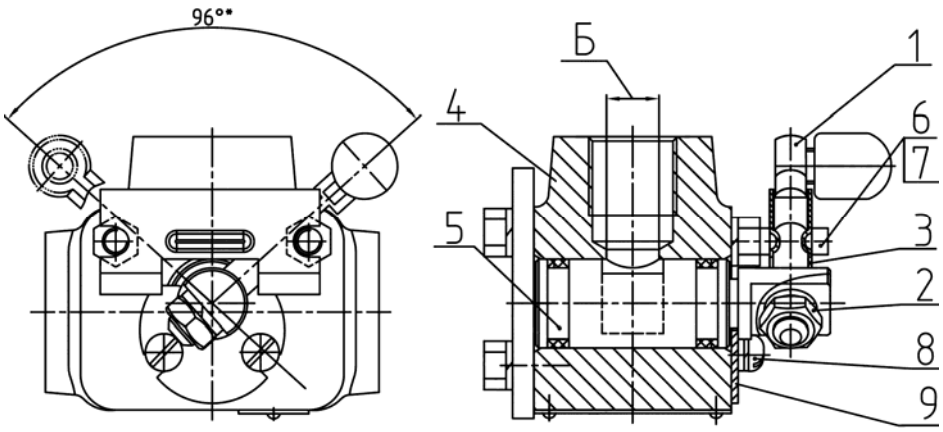



**Figure 7.7**

**Dismounting of sealing rings:**

a) move control valve 5 (Figure 7.8) towards side “B” **by 7…8 mm, maximum!** (to avoid cutting rings 3 and 4 against sharp edges of three inside openings in the body);
b) extract from groove 2 of control valve sealing ring 5 and protective ring 6;
c) shift control valve from the body to opposite side “A”;
d) extract from groove 1 of control valve sealing ring 4 and protective ring 3;

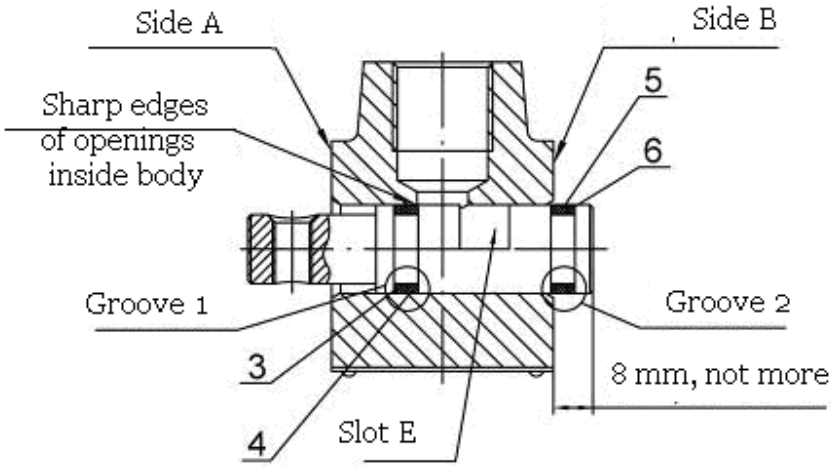



**Figure 7.8**

**Valve is assemblied** in reverse order:
a) before assembly wash parts in diesel fuel and wipe with clean cloth;
b) grease rings and control valve with thin layer of consistent lubricant LITOL-24;

**Checking proper assembly of reverse valve:**
a) lever 1 (Figure 7.7) must turn within stops 6 within angle of 96 degrees in extreme positions I and II (Figure 7.9), lever must be fixed with stopper 9 (Figure 7.7);
b) put lever 1 (Figure 7.7) in position I, with slot «E» (Figure 7.9) of control valve being visible through both openings «В» and «Г»;
c) put lever 1 (Figure 7.7) in position II (Figure 7.9), with slot «E» of control valve being visible through both openings «Г» and «Д

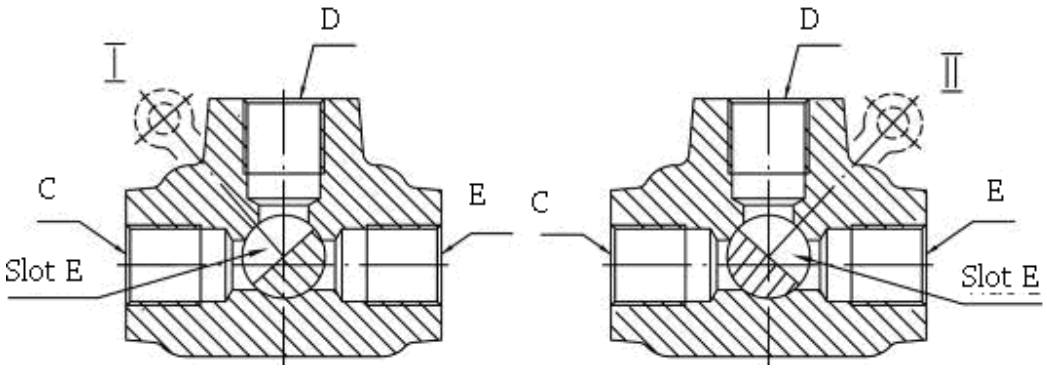


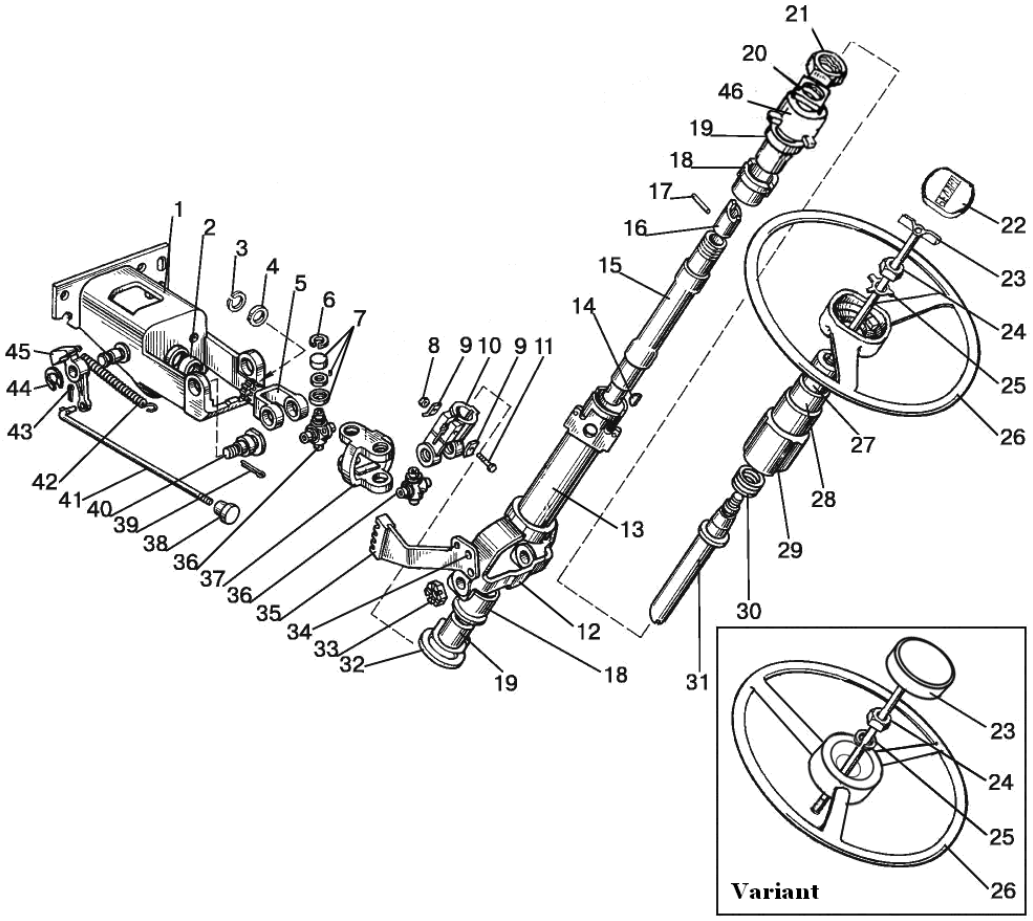

**Figure 7.9**

Make installation of reverse valve on tractor in reverse sequence.

## 7.2 Steering column

### 7.2.1 Disassembly-assembly of steering column

Tractor steering column without reverse steering station consists of pipe (13), **(**figure 7.10**)** and arm (1), which are secured with screws (40), nuts (33) and cotter pins (39). Inside pipe (13), in shock absorbers (18) on polyamide bushings (19) shaft (15) with rigidly fixed on it yoke (10) of cardan shaft is installed.




1-arm; 2-bushing; 3-retaining ring; 4-washer; 5-yoke; 6-locking ring; 7-bearing; 8-nut; 9-washer; 10-yoke; 11-bolt; 12-yoke; 13-pipe; 14-segment key; 15-shaft; 16-shank; 17-pin; 18-shock absorber; 19-polyamide bushing; 20-nut; 21-checknut; 22-cover; 23-clamp; 24-nut; 25-washer; 26-steering wheel; 27- inside bushing; 28- middle bushing; 29-sheath; 30-spring; 31-steering shaft; 32-washer; 33-nut; 34-pin; 35-sector; 36-cross-piece; 37-yoke; 38-handle; 39-cotter pin; 40-screw; 41-tie-rod; 42-spring; 43-cotter pin; 44- stop washer; 45-fixing element; 46-chipper.

**Figure 7.10** Tractor steering column without reverse steering station.

Shank (16) with pin (17) can move free along longitudinal grooves of shaft (15) to provide adjustment of steering wheel (26) by height.

Shaft (15) is secured by nut (20) with check nut (21). Under nut (21) baffle (46) of turn indicator is installed. Yoke (5) of cardan shaft is freely installed inside polyamide bushing (2) and via washer (4) is locked by ring (3). Tilting angle of steering wheel and column (26) is step-wise adjusted by means of tooth segment (35), made as one piece with yoke (12) of pipe (13) and fixing element (45) with spring (42) and steering tie-rod (41).

**To disassembly steering column** do the following:

To disassembly steering column do the following:

a) unscrew screws for fastening sheath (29) to dashboard;

b) remove cover (22), unscrew clamp (23) and pull out steering wheel (26) together with spring (30), shaft (31), sheath (29) and и bushings (27) and (28);

c) insert metal rod between eyelets of yoke (10), (figure 7.11), of cardan shaft and unscrew check nut (21) by 1-2 turns using wrench S=36 mm;

d) unbend retaining washer (9) on the side of nut (8), unscrew it and pull out bolt (11) with the second washer (9);

e) pull baffle (46) and extract shaft (15) together with shank (16) and pin (17) from yoke (10) and pipe (13);

g) unscrew nut (20) with check nut (21) and remove baffle (46) from pipe (13) (46);

h) pull out of pipe (13) bushing (19) with shock absorber (18) and disconnect them;

i) deflect yoke (10), remove washer (32) and pull out the second bushing (19) with shock absorber (18).

k) unscrew bolts “B”, **(**figure7.11**)**, and dismount metering pump “A”;

l) remove retaing ring (3) and washer (4);

m) pull out cardan connection (5), (7), (10), (36), (37) and bushing (2);

n) remove spring (42).

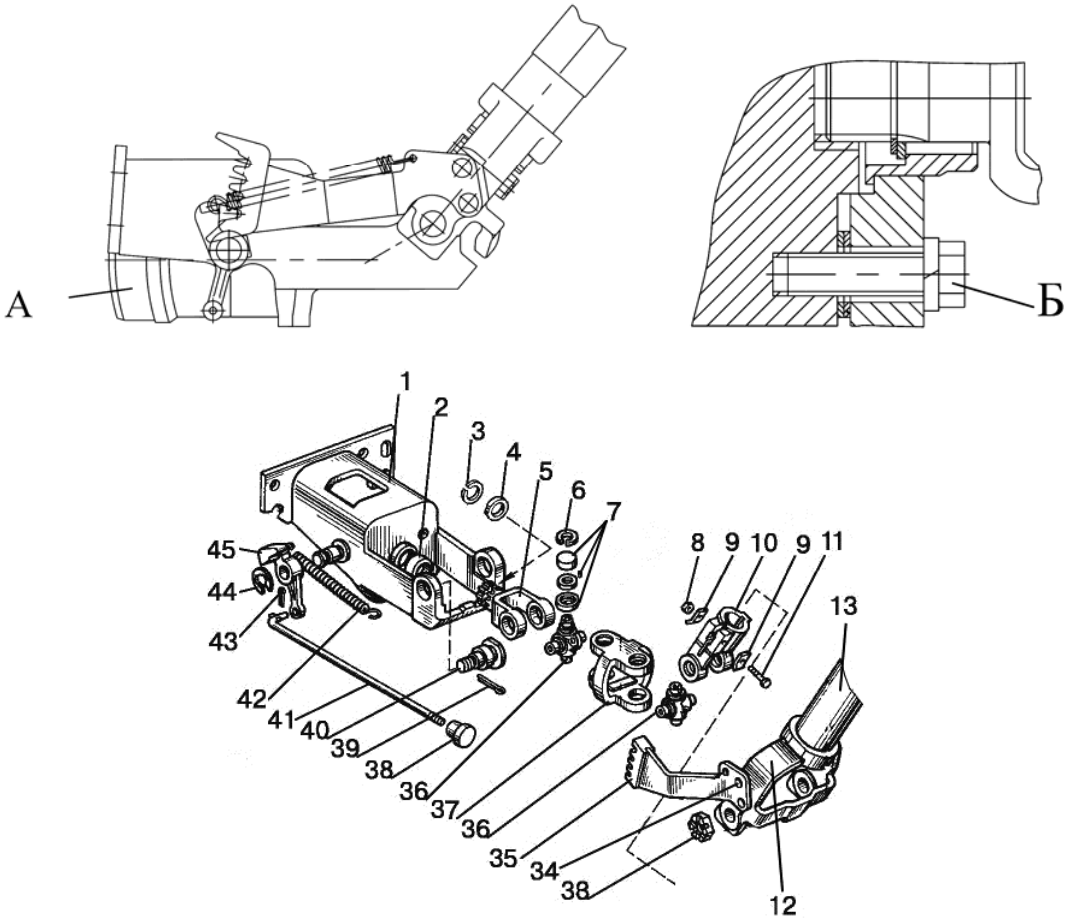



**Figure 7.11**

m) unpin and unscrew by wrench S = 27 мм nuts (38) on both sides of arm (1), and the pull out screws (40);

n) remove pipe (13), made as one piece with yoke (12) and sector 35;

o) unpin and disconnect tie-rod (41), from clamp 45 (Figure 7.12);

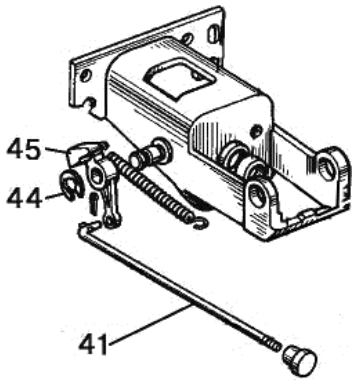



**Figure 7.12**

p) remove retainer ring (44) and clamp (45).
Make assembly of steering column on the following order:

1 secure arm (1) **(**figure 7.13**)** in bench vice, lubricate axle (A) with grease LITOL-24;
2) put clamp (45) on axle (A) and lock with ring (44);

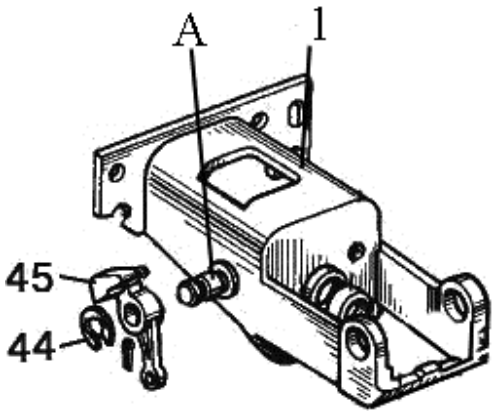



**Figure 7.13**

3) insert bushing 2, (Figure 7.14) in arm 1;
4) lubricate inside surface of bushing (2) with grease LITOL-24» and insert cardan connection (5), (7), (10) (36) (37) inside bushing;
5) put washer (4) and lock with retainer ring (3);

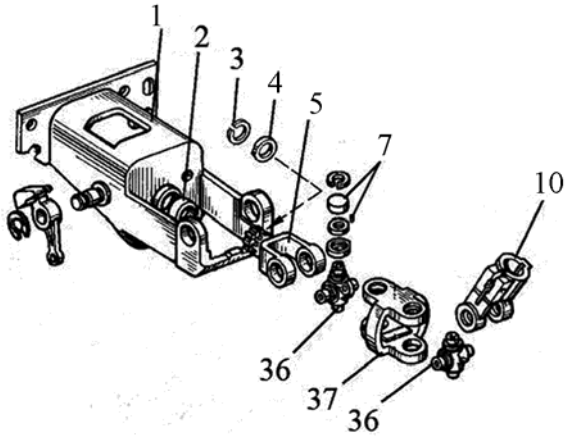



**Figure 7.14**

6) connect pipe yoke (13), **(**figure 7.15**)** with arm (1), having performed the following operations:
6.1) align axles of openings of pipe yoke (13) and arm (1), with tenon «A» of clamp (45) fitted in hollow of sector teeth (35);
6.2) insert screws (40) on inside arm sides (1) to the end, and screw up nuts (33) and cotter pin them;

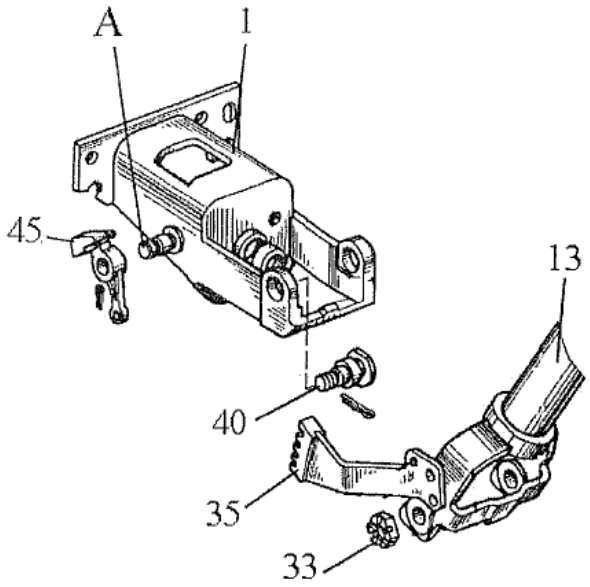



**Figure 7.15**

7) put spring 42, (Figure 7.16), between clamp and pipe

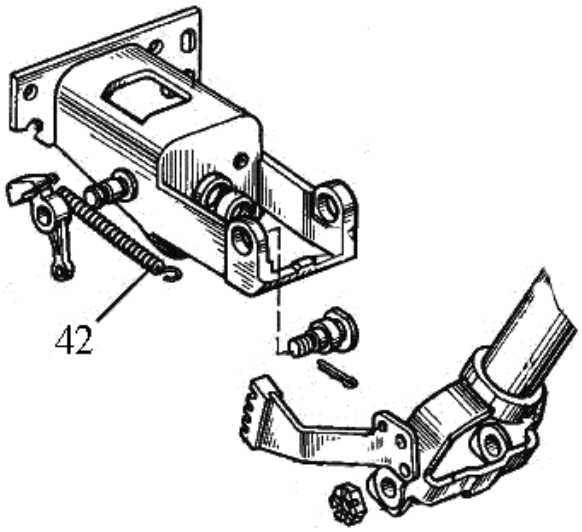



**Figure 7.16**

8) mount shock absorbers (18), **(**figure 7.17**)** up to shoulders in upper and lower end faces of pipe (13);

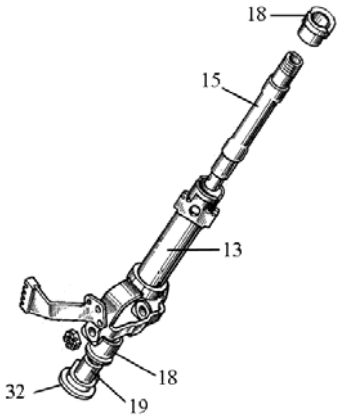



**Figure 7.17**

9) install bushing (19) in shock absorber (18) on the bottom side of pipe (13) to the end;

10) lubricate inside surface of bushing (19) with grease LITOL-24;

11) put on the end face of washer (32) grease LITOL-24 and press with hand to end face of bushing (19);

12) supporting from below pipes (13) bushing (19) with shock absorber (18) and washer (32), put from top side shaft (15) inside pipe (13);

13) put segment key (14), (figure 7.17), measuring 5x10 mm inside key groove of shaft (15) and mount shank of shaft inside yoke (10) of cardan connection so that key went into key groove of yoke (10);

14) align cut of shaft (13) with opening in yoke (10);

15) put bolt (11) with bending washer (9) and nut (8) with second washer (9);

16) tighten nut (8) and lock bolt and nut with bending washers;

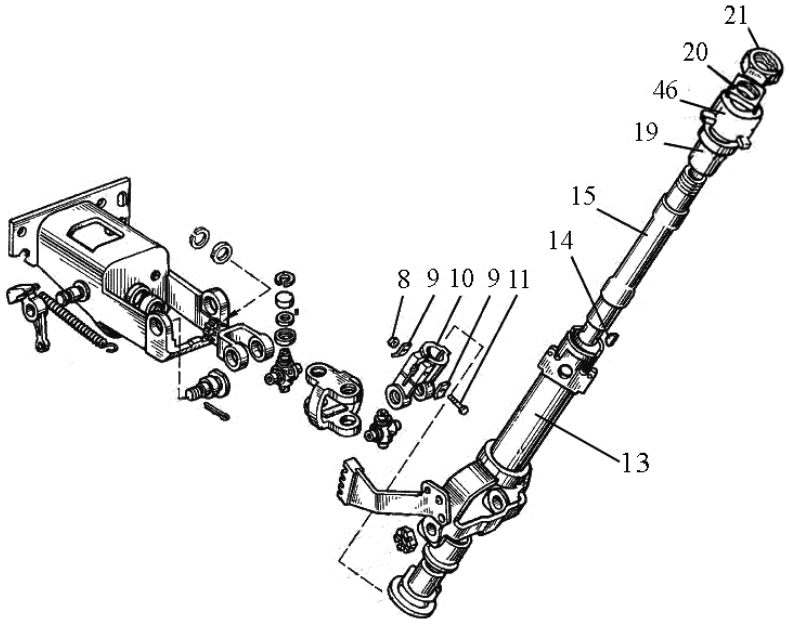



**Figure 7.18**

17) insert upper bushing (19), (figure 7.19) inside pipe (13), having first lubricated inside surface with grease LITOL-24;
18) put on pipe (13) baffle (46);
19) screw nut (20) and check nut (21) onthreaded shank of shaft (15);
20) press cardan connection to pipe (13), having selected plays between bushings, shock absorbers and end faces of pipe;
21) screw nut (20) until it touches baffle (46) and unscrew it by (0.5–1) turn;
22) tighten check nut (21);

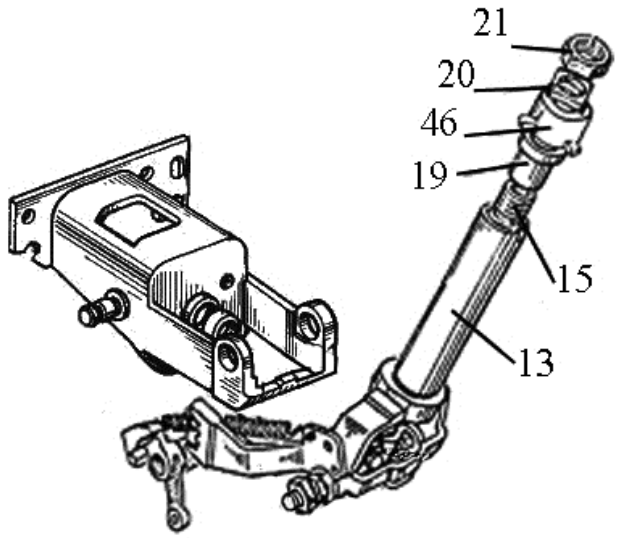



**Figure 7.19**

23) install metering pump «A», (figure 7.20), and fasten it with four bolts «B» (M10x30) with spring washers;
24) assembly steering wheel (26), (figure 7.21) with shaft (31), having installed spring (30), sheath (29), bushings (27), (28), retaining washer (25), nut (24) and clamp (23)

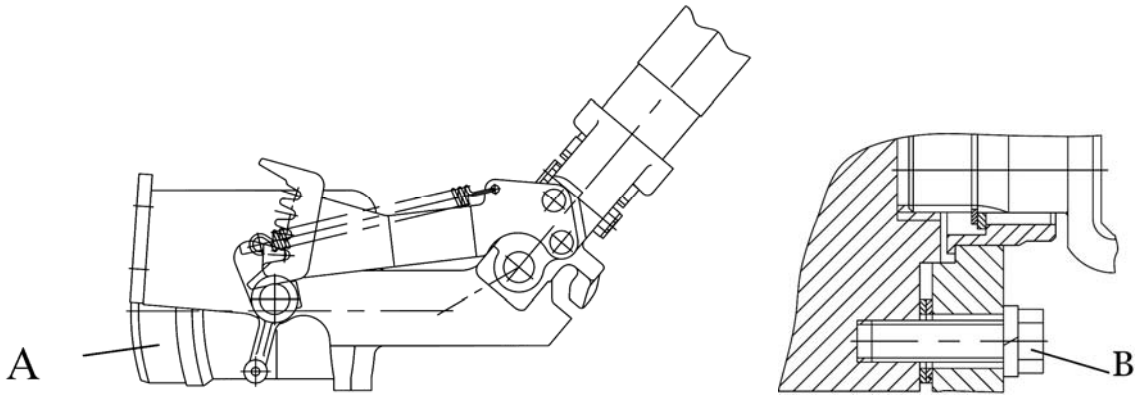



**Figure 7.20**

25) insert steering wheel (26), (figure 7.21), as an aasembly with shaft (31), sheath (29), bushings (27) and (28) inside pipe (13) of steering column;

26) secure sheath (29), (figure 7.21) with screws (4) **(**figure 7.10**)** in section 10.4 “Dismounting-mounting dashboard 80-3805010-Д1 of tractors Belarus-1025/1025.2/1025.3” to arm of dashboard;

27) screw up clamp (23), **(**figure 7.21), and close with cover (22);

28) install tie-rod (41), **(**figure 7.10**)**, and connect it to clamp (45) using washer and cotter pin

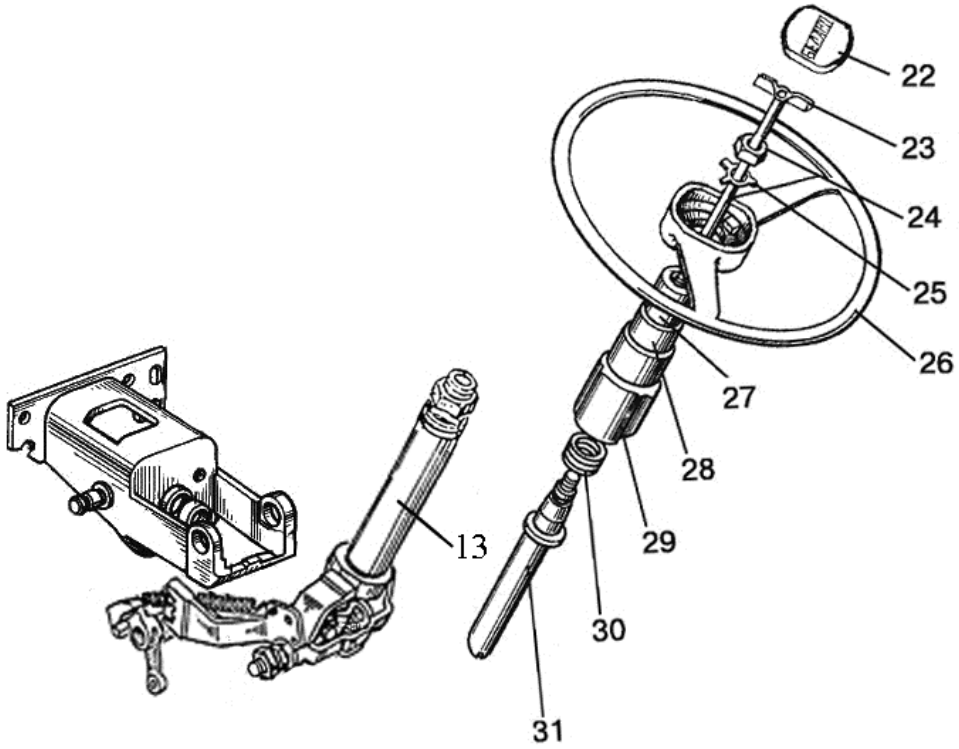



**Figure 7.21**

**Checking if assembly was properly made:**

After steering column is assembled and mounted on tractor, check steering for absence of “motoring” with diesel functioning on the parking lot or during travel at bottom gear. Steering wheel must reliably return to neutral position. If it’s not the case, check if assembly was made right. On tractor with reverse steering station parts (27), (28), (29), (30), **(**figure 7.10**)**, are not installed.

### 7.2.2 Disassembly-assembly of steering column of the reverse control station

The tractor steering column of reverse control station consists of tube 1, (Figure 7.22), and arm 2, fastened with screws 3, nuts 4 and washers 5.

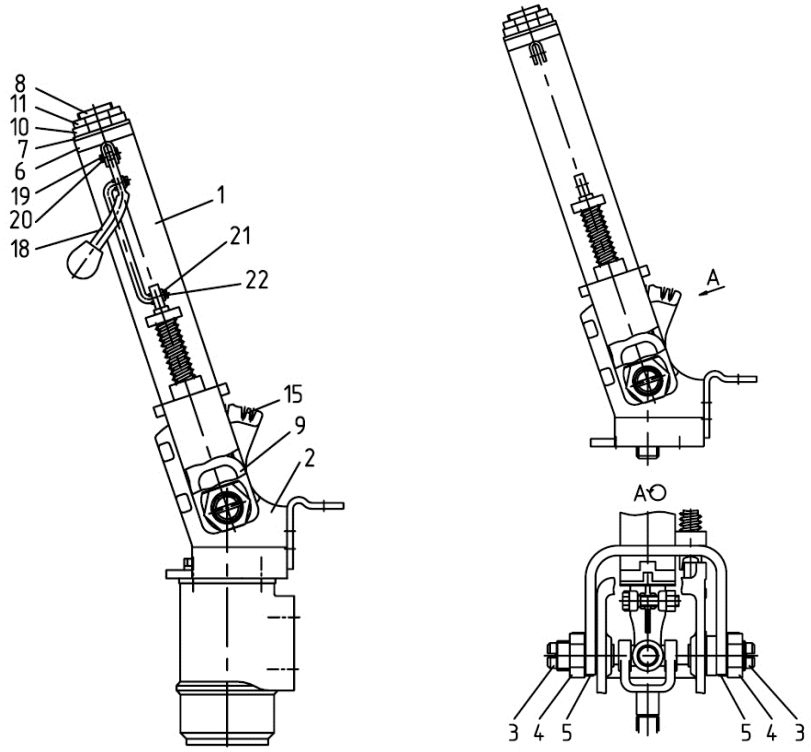



**Figure 7.22**

Within tube 1, in shock absorbers 6 on plyamide bushings 7 shaft 8 with firmly secured cardan shaft is installed. In a way similar to forward travel steering column, shank with pin can move to maximum in longitudinal grooves of shaft 8, providing adjustment of steering wheel by height. Shaft 8 is fixed with nut 10 and check nut 11. Cardan shaft 9 is firmly fixed shaft 8 with bolt 12 (Figure 7.23) nuts 13 and washers 14.

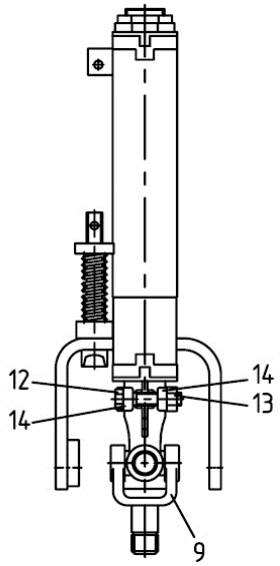



**Figure 7.23**

Tilting angle of the steering column and wheel are stepwise adjusted by means of tooth sector 15 (Figure 7.22), made as one piece with arm 2 of tube 1 and fixing elements 16 (Figure 7.24) with spring 17 and control lever 18 (Figure 7.22).

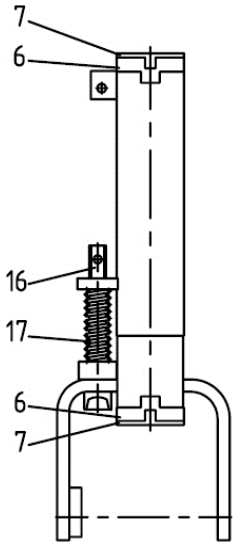



**Figure 7.24**

**To disassembly steering column do the following:**

a) fasren steering column by arm 2 (Figure 7.22) in vice;

b) remove cotter pins 19 and 22 (Figure 7.22), washer 21, pull out pin 20 and remove lever 18;

c) unscrew bolts 23 (Figure 7.25) and pull them out together with washers 24, and then dismount metering pump 25;

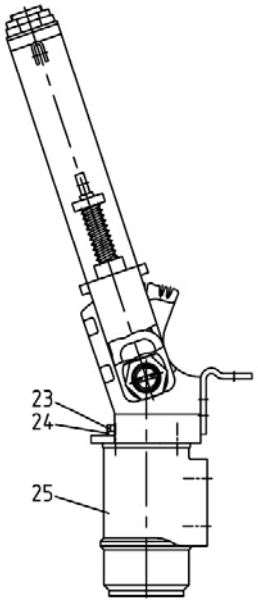



**Figure 7.25**

d) unbend washers 5 (Figure 7.22);
e) unscrew by 2-3 turns nuts 4 and unscrew screws 3 together with nuts 4;
f) remove arm 2;
g) unbend stop washer 14 (Figure 7.23) on the side of nuts 13;
h) unscrew nut 13 and pull out bolt 12 together with second washer 14;
j) remove cardan 9;
i) extract segment boss 27 (Figure 7.26);

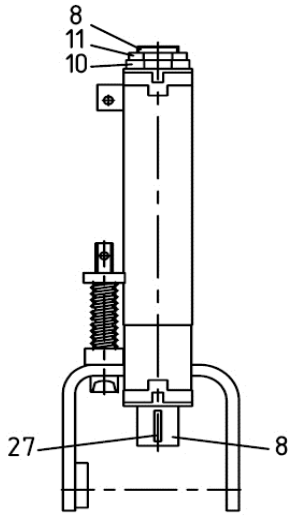



**Figure 7.26**

k) extract shaft 8 (Figure 7.22) with nut 10 and check nut 11;
l) unscrew nut 10 and check nut 11 off shaft 8;
m) on both sides of tube 1 extract polyamide bushings 7 with shock absorbers 6, and disconnect them;
n) pull out fixing element 16 (Figure 7.24) and remove spring 17.

**Observe the following sequence of steering column assembly:**

a) fasten arm 2 (Figure 7.22) in the bench vice;
b) put between arm and yoke of tube 1 spring 17 (Figure 7.24) and having lubricated friction surfaces with LITOL-24, insert fixing element 16;
c) put inside tube 1 1 (Figure 7.22) from its top end face, shock absorber 6 to the end, then lubricate inside surface of polyamide bushing 7 with grease LITOL-24, and put it inside shock absorber until it touches shoulders;
d) screw on shaft 8 nut 10 by 2-3 turns, insert shaft in tube 1;
e) on the other end face of tube 1 put shock absorber 6 to the end, and put it on shaft 8, at the same time inserting shock absorber 6 until it touches shoulders;
f) put segment pin 27 (Figure 7.26);
g) install on shaft 8 (Figure 7.22) on the side of segment key cardan 9 and , having aligned opening in its oke with shaft cut, put bolt 12 (Figure 7.23) with washer 14 in opening of cardan yoke, put the second washer 14 on the bolt;
h) screw nut 13, tighten and lock it by bending washer 14;

i) holding cardan 9 pull shaft 8 upwards to the end (Figure 7.22);

j) screw to the end nut 10, then unscrew it by 0.5 – 1.0 turn and lock with check nut 11. Axial play of shaft 8 must not exceed 1 mm;

k) align axes of openings of tube yoke 1 and arm 2, with spike of fixing element 16 (Figure 7.24) getting inside hollow of sector 15;

l) screw to the end screws 3 (Figure 7.22) in yokes of arm 2, put on screws washers 5 and screw up nuts 4 by 3-4 turns;

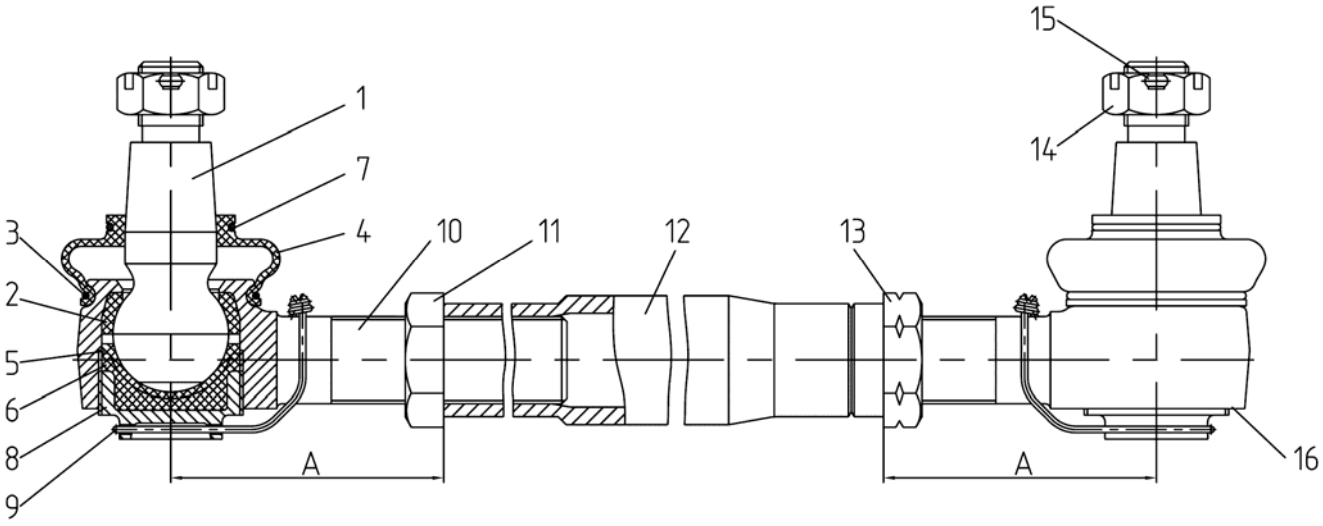
m) connect metering pump 25 (Figure 7.25) to arm 2 (Figure 7.22) and fasten it with bolts 23 (Figure 7.25) with washers 24;

n) put lever 18 (Figure 7.22) using pin 20, washers 21 and cotter pins 19 and 22;

o) mount steering column on tractor and with engine operating adjust alignment of shaft 8 and control valve of metering pump 25 (Figure 7.25) by moving arm 2 (Figure 7.22) in relation to yokes of tube 10, screwing in and unscrewing screws 3 to the right or left;

p) lock screws 3 with nuts 4 and unbend locking washers 5.

### 7.3 Disassembly of steering rod




1 – ball pin; 2 – upper insert; 3 – ring; 4 – sheath; 5 – insert; 6 – lower insert; 7 – ring; 8 – plug; 9 – wire; 10, 16 – joint body; 11 – nut; 12 – pipe; 13 – nut; 14 – nut; 15 – cotter pin

**Figure 7.27** Steering rod

Make disassembly of steering tie-rod **(**figure 7.17**)** in the following order:
a) unscrew by 1-2 turn nuts (11) и (12), unscrew joints (10) and (16);
b) untie wire (9), unscrew plugs (8);
c) extract inserts (5) and (6), pull out cotter pins (15);
d) unscrew nuts (14), pull out pins (1) and inserts (2);
e) remove rings (3) and (7), remove sheath (4).
f) remove rings 3 and 7, remove sheath 4.

Assembly steering tie-rod in sequence reverse to disassembly:
a) put inserts (2), put pins (1), then inserts (5), and after that put inserts (6);
b) screw in plugs (8), tie up wire (9), put on sheathes (4) and place rings (3) and (7);
c) screw up nuts (14), insert cotter pins (15) and secure them;
d) screw joints (10) and (16) inside pipe (12) and lock with nuts (11) and (13).

## 8 CABIN

Cabin of tractors BELARUS-1221.2/1221B.2/1221.3/1221.4 has protective properties providing operator safety during tractor turn over in emergency situations.

The cabin is equipped with ventilation and heating systems.

Noice and vibration parameters on the operator's working seat meet requirements set to cabins of tractors of this series.

The tractor cabin is equipped with wipers of front and rear glass, windshield washer, rear view mirrors.

Cabin glasses are made in compliance with Regulations of ЕЭК ООН №43.

As emergency exts the cabin of tractors BELARUS-1221.2/1221B.2/1221.3/1221.4 has left- and right-side doors, flap roof latch and flap rear window.

### 8.1 Dismounting and mounting of the cabin

Before dismounting cabin from the arms do the following:

a) disconnect:

1) for tractors BELARUS-1221.2/1221B.2 - connectors 23 of harness on engine and transmission (Figure 11.1) section **11.1.1** "Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.2/1221B.2";

2) for tractors BELARUS-1221.3 - connectors 23 of harness on engine and transmission (Figure 11.2) section **11.1.2** "Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.3";

3) for tractors BELARUS-1221.4 - connectors 23 of harness on engine and transmission (Figure 11.3) section **11.1.3** "Dismounting electrical equipment elements of engine (MMZ or Deutz) mounted on tractors BELARUS-1221.4";

b) disconnect:

1) for tractors BELARUS-1221.2/1221B.2 - connectors of harness 13 on cabin, see section **11.5.2** "Operations when dismountinge/mounting cabin";

2) for tractors BELARUS-1221.3 (1221-8700410) - connector of harness 8 on cabin, see section **11.5.5** "Operations when dismountinge/mounting cabin";

3) for tractors BELARUS-1221.3 (1221-8700210-E) connector of harness 8 on cabin, see section **11.6.2** "Operations when dismountinge/mounting cabin";

4) for tractors BELARUS-1221.3 (1221-8700250-E) - connector of harness 8 on cabin, see section **11.7.2** Operations when dismountinge/mounting cabin;

5) for tractors BELARUS-1221.4 (MMZ или Deutz) - connector of harness 8 on cabin, see section **11.8.2** "Operations when dismountinge/mounting cabin";

6) for tractors BELARUS-1221.4 Deutz (1221-8700910-B) - connector of harness 8 on cabin, see section **11.9.2** "Operations when dismountinge/mounting cabin";

7) for tractors BELARUS-1221.4 MMZ (1221-8700910-L) - connector of harness 8 on cabin, see section **11.10.2** "Operations when dismountinge/mounting cabin";

c) disconnect sleeves of left- and right-side leads 14 from fastening to arms 11 (Figure 9.8) раздел **9.1** "Disassembly-assembly of hydraulic lift"

d) disconnect tie-rod 24, for parking brake control, from lever 14, (Figure 4.128) section **4.6.1** "Dismounting parking and right-side foot brake as an assembly";

e) unscrew bolts 25 and remove pedals 1 and 2, of left- and right-side brakes, (Figure 4.130) section **4.6.4** “Dismounting levers of brakes”;

f) dismantle clutch control by doing the following:

1) disconnect pipeline 35, flexible sleeve 15 (Figure 8.1), by unscrewing cap nuts;

2) disconnect pusher of main cylinder on reversal 40 from 39, by pulling out pin 11;

3) dismantle main cylinder on reversal 40 from arm 46, by unscrewing two bolts 41;

4) dismantle spring 36 and pedal 39;

5) dismantle arm 46 from cabin, by unscrewing three bolts 45;

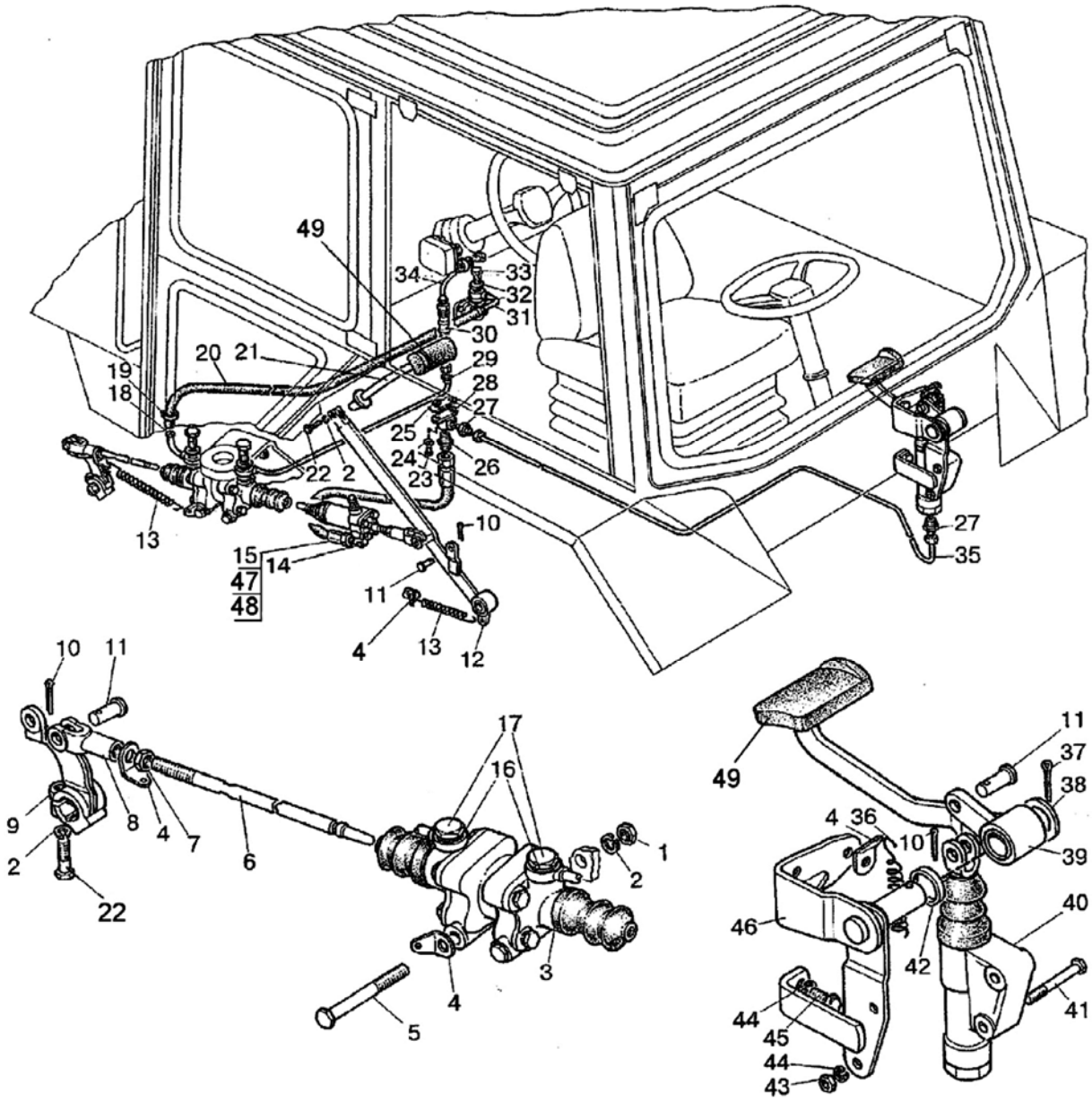



**Figure 8.1**

6) dismantle angle 28 from cabin by unscrewing two bolts 23;

7) unscrew bolt 22, remove rod 21;

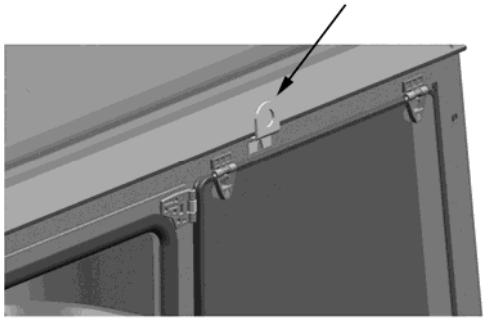


**Figure 8.2**

g) dismount fuel supply control, and to do this:

1) unpin pins and dismount tie-rod 28 of pedal 25 for fuel supply control, (Figure 3.18) section **3.12** “Disassembly-assembly of fuel supply control, mounted on tractors BELARUS-1221B.2” and (Figure 3.19) section **3.13** “Disassembly-assembly of fuel supply control, mounted on tractors BELARUS-1221.2/1221.3”;

2) dismantle steel rope of engine shut down, and to do this:

- disconnect fixing element 2 with screw 1;
- loosen nuts 5 that fasten rope 14 to arm 7;

h) when your tractor is equipped with hydraulic hook, disconnect control handle 1 (Figure 8.3) from two-shoulder lever 2 and extract handle from slot inside the cabin to the operator’s left side;

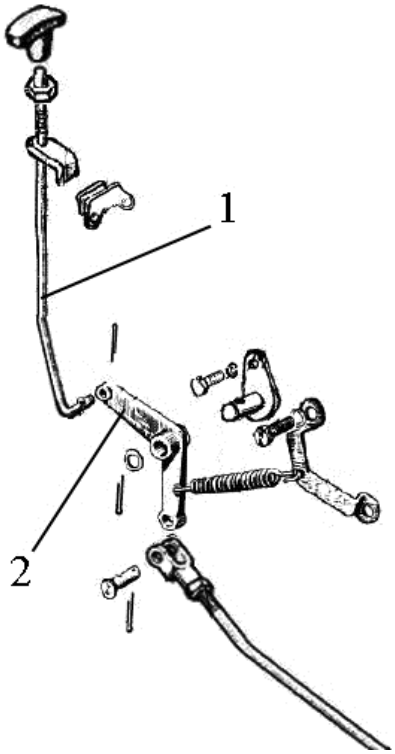



**Figure 8.3**

i) disengage cooling loop of air conditioner by means of quick-disconnect connections BRS-81 2 (Figure 8.13) section **8.8** “Dismounting-mounting air conditioner on tractors BELARUS-1221.3/1221.4”, and undock heater hoses;

j) unpin four cotter pina 8, nuts M16 (Figure 8.5);

k) unscrew four nuts 7 (M16), remove washers 6 and bottom vibration isolaters 5;

l) hoist cabin above tractor chassis, using for slinging eyelets on the left- and right-side of cabin, make slinging according to diagram (Figure 8.2) (cabin mass ≈ 600 кg);

m) remove bolts 2 (Figure 8.5) M16x120 with washers 1;

n) put the cabin on even terrain (on wooden planks or metal supports);

o) remove cup of vibration isolator (3), upper vibration isolator (4) from holes of front and rear support arms.

**Mount cabin on tractor chassis in reverse sequence.**

Tighten nuts 7 until opening appears under cotter pin, in a way ro exclude turning through of bottom vibration isolator 5 when turning by hand, If necessary turn nut 7 by 1-2 turns.

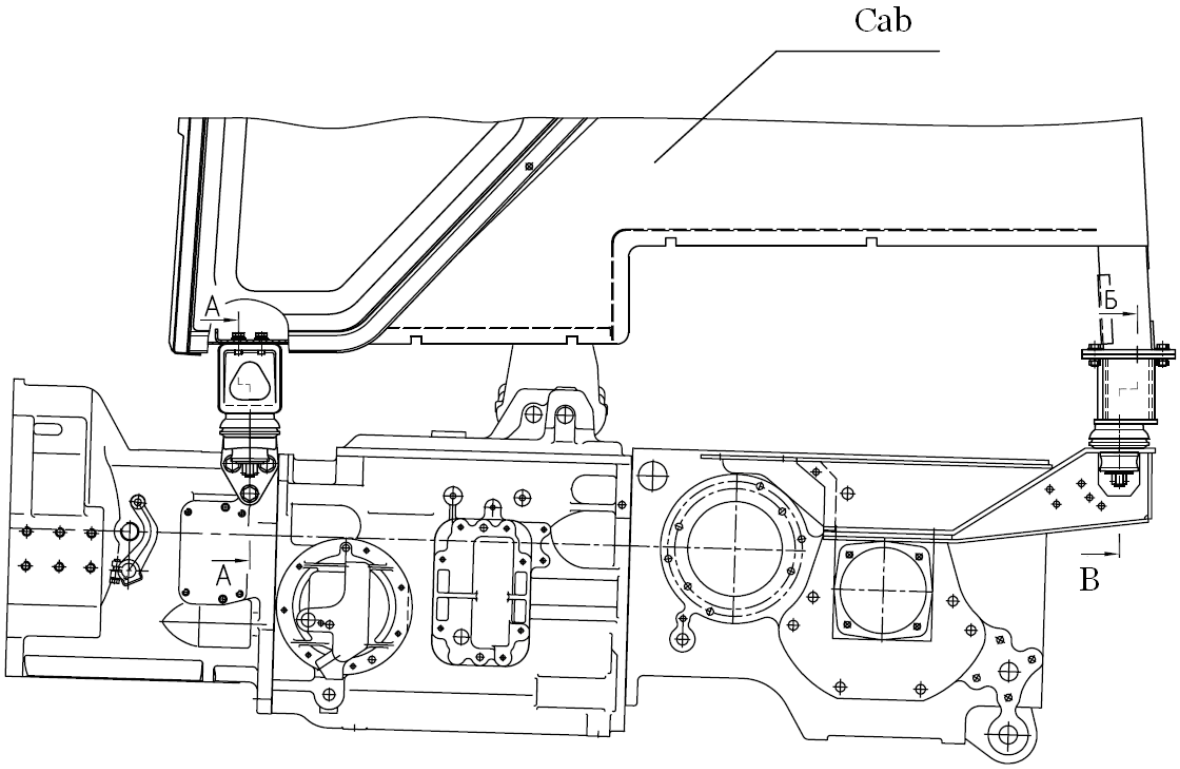
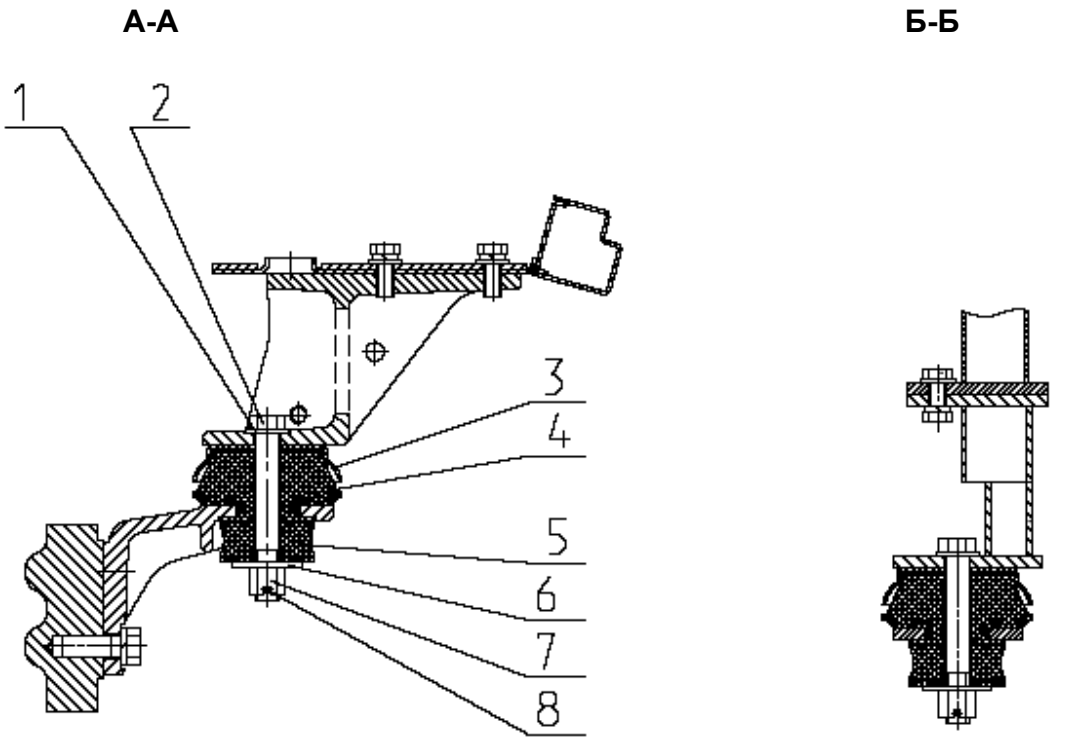



**Figure 8.4**




1 – washer; 2 – bolt (M16); 3 – cup of vibration isolator; 4 – upper vibration isolator; 5 – lower vibration isolator; 6 – washer; 7 – nut; 8 – cotter pin.

**Figure 8.5**

## 8.2 Dismounting-mounting of facia of tractor BELARUS-1221.2/1221B.2

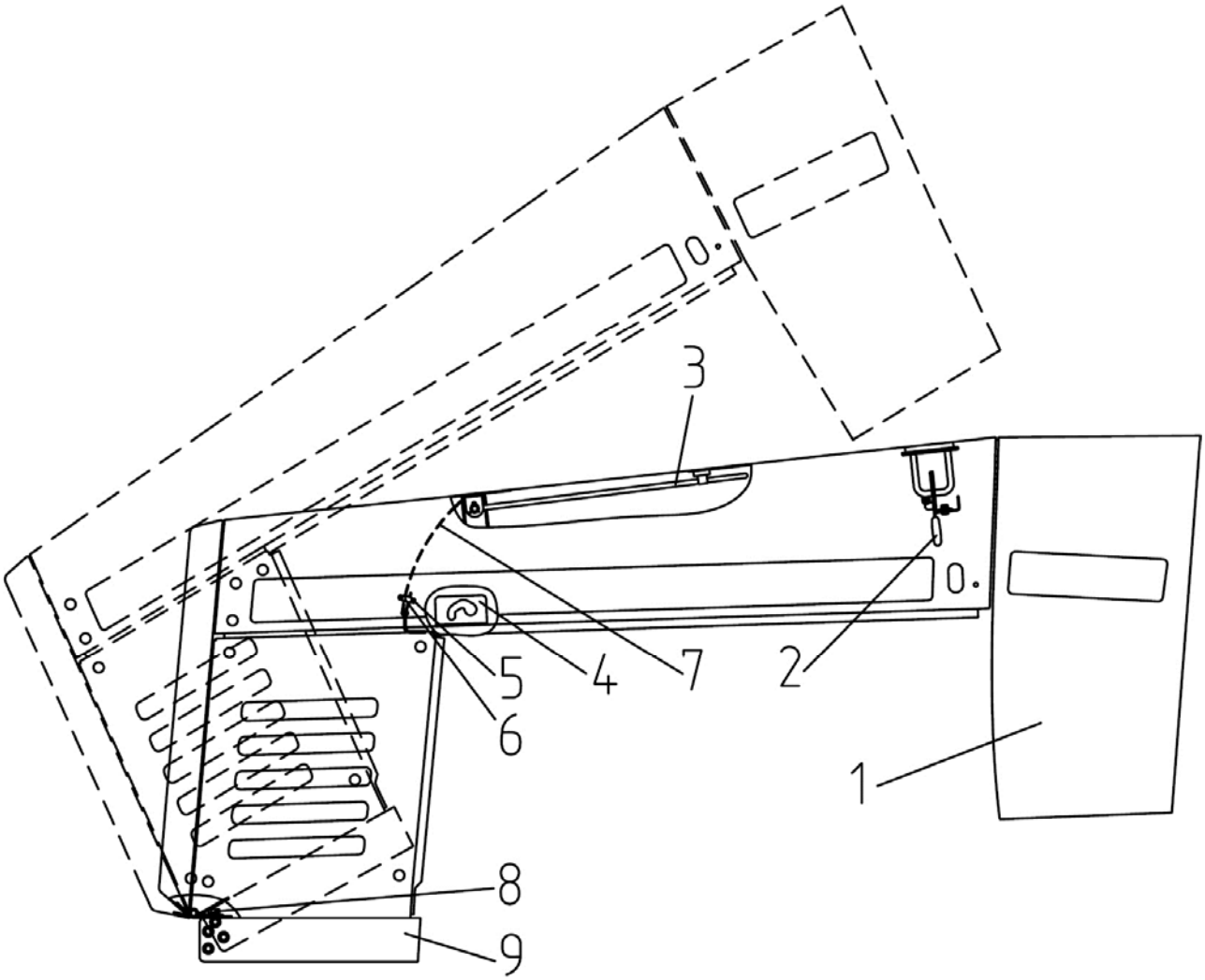
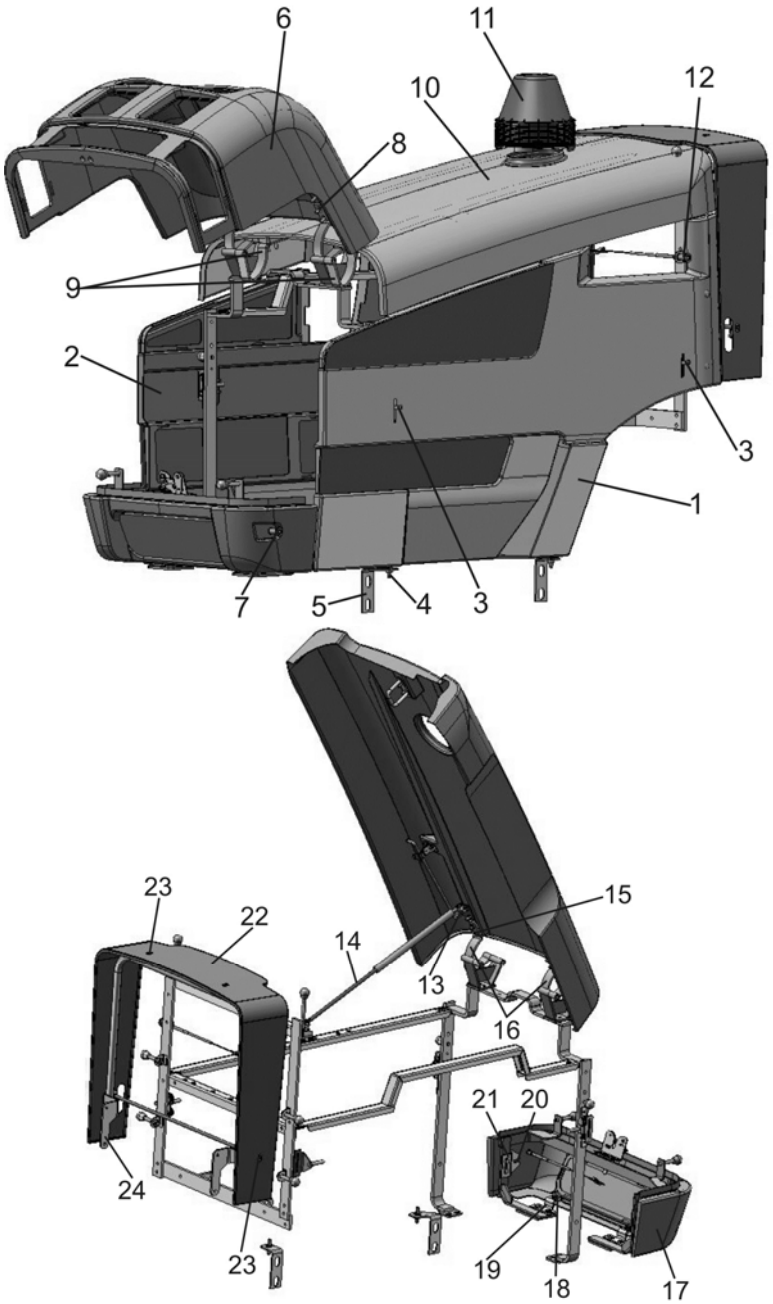



**Figure 8.6** Facia of tractors

Dismount facia, and to do this perform the following:
a) dismount hood 1 (Figure 8.6), and to do this:
1) pull lever of lock 2;
2) lift hood 1 up and fix tie-rod 3 in opening of arm 4;
3) unscrew two screws 5 on clutch 6 and release hood 1 from rope 7;
4) release tie-rod 3 from opening in arm 4 and fix it on hood 1;
5) unscrew four bolts 8, connecting hood with U-section 9;
6) dismount hood 1.

Facia is mounted in reverse sequence.

### 8.3 Dismounting-mounting facia of tractors BELARUS-1221.3/1221.4




1 – side plate; 2 – side plate; 3 – lock; 4 – fixing element; 5 – support; 6 – mask; 7 – control rope; 8 – nut; 9 – loop; 10 – hood; 11 – monocyclon; 12 – control rope; 13 – cotter pin; 14 – pneumatic lift; 15 – nut; 16 – loop; 17 – skirt; 18 – nut; 19 – arm; 20 – nut; 21 – arm; 22 – shell; 23 – bolt; 24 – arc.

**Figure 8.7** Dismounting tractor facia

To dismount the facia do the following:
a) dismantle side panels 1 and 2 (Figure 8.7), and to do this:
1) pull levers of locks 3 down;
2) raise side panels 1 and 2 up and pull to remove fixing elements from supports 5;
b) remobe mask 6, and to do this:
1) pull control rope 7;
2) raise mask 6;
3) unscrew four nuts 8, connecting mask 6 and loops 9;
c) dismount hood 10, and to do this:
1) remove monocyclone 11;
2) pull handle of control rope 12;
3) raise hood 10;
4) remove cotter pin 13 and disconnect pneumatic lift 14;
5) unscrew four nuts 15, connecting hood 10 and loops 16;
d) remove skirt 17, and to do this:
1) unscrew two nuts 18, connecting skirt 17 and arms 19;
2) unscrew four nuts 20, connecting skirt 17 and arms 21;
e) remove shell 22, and to do this:
1) unscrew four bolts 23, connecting 22 with bow 24.

Make facia assembly in reverse sequence.

## 8.4 Disassembly-assembly of facia panels of the right-side panel

a) unscrew bolts (10) and (11), remove cover (3) (figure 8.8);
b) unscrew bolts (11) and remove panel (1);
c) unscrew bolts (11) and remove arm (2).
Make assembly in sequency reverse to disassembly.

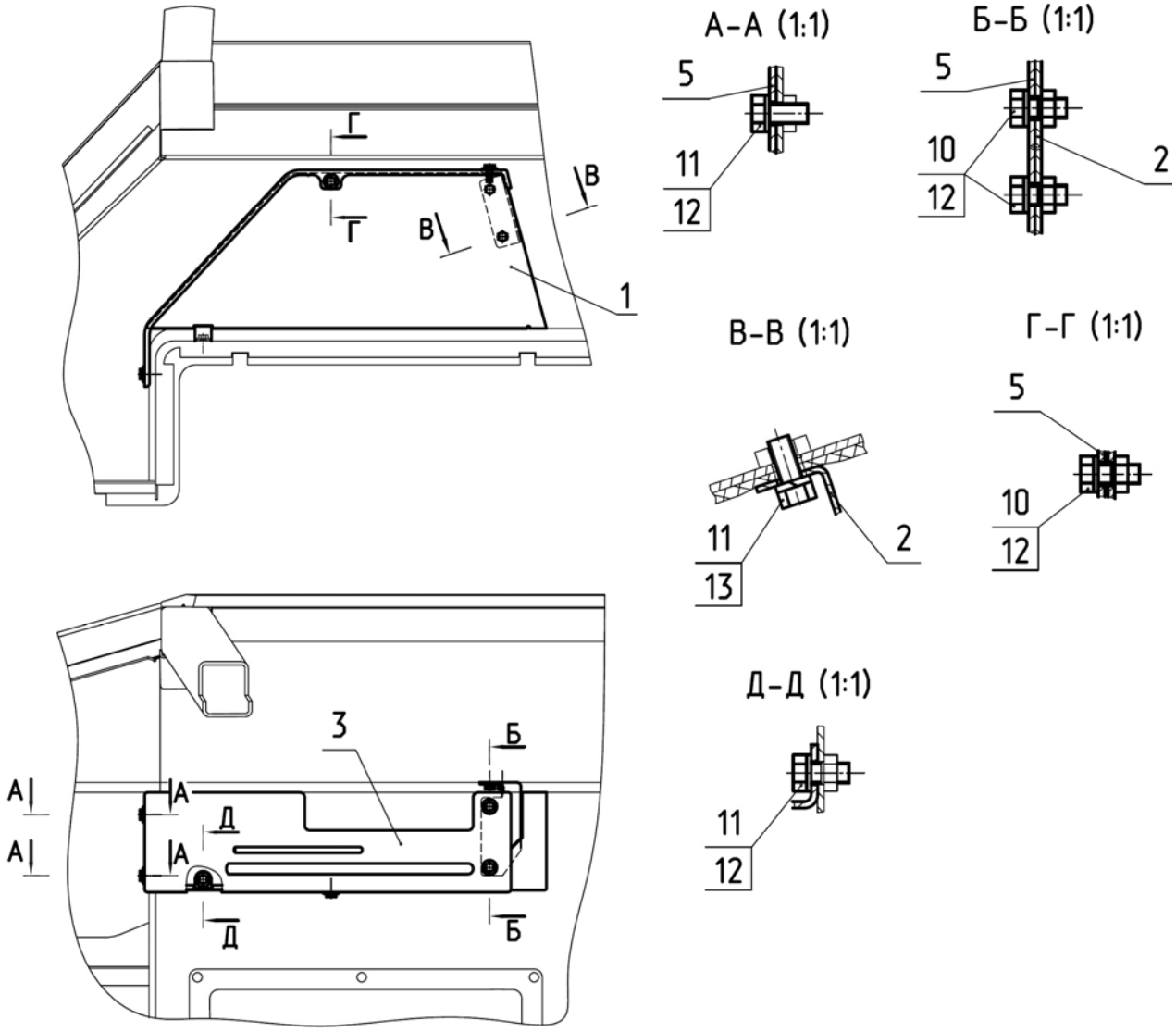



**Figure 8.8**

### 8.5 Disassembly-assembly of panels 85-6702550 of front cabin wall

a) 1) unscrew bolt (6) (figure 8.9)**)** (section D-D), (7) (section B-B), remove left-side panel (4) 80-6700320;

b) unscrew bolts (5) (section H-H), (7) (section B-B), remove right-side lower panel (1) 85-6700330,

c) remove right-side higher panel (2) 85-6700340;

d) unscrew bolts (7) (section G-G) remove panel (3) 80-6700300.

Assembly panels in sequence reverse to disassembly.

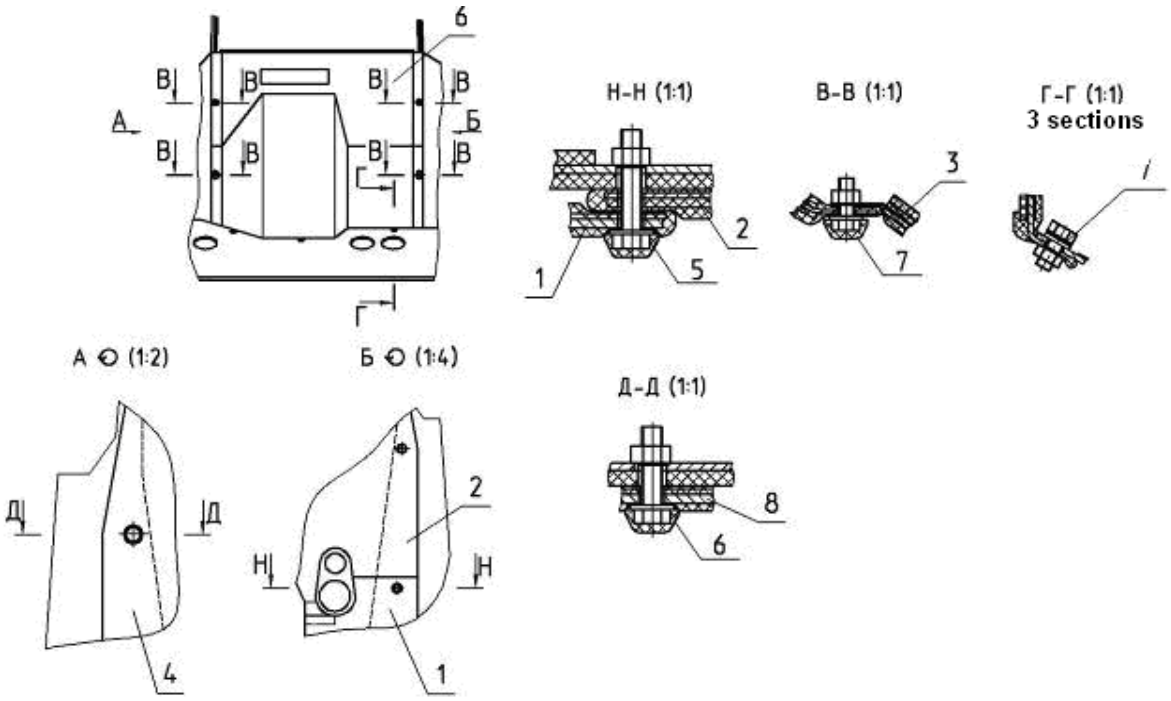


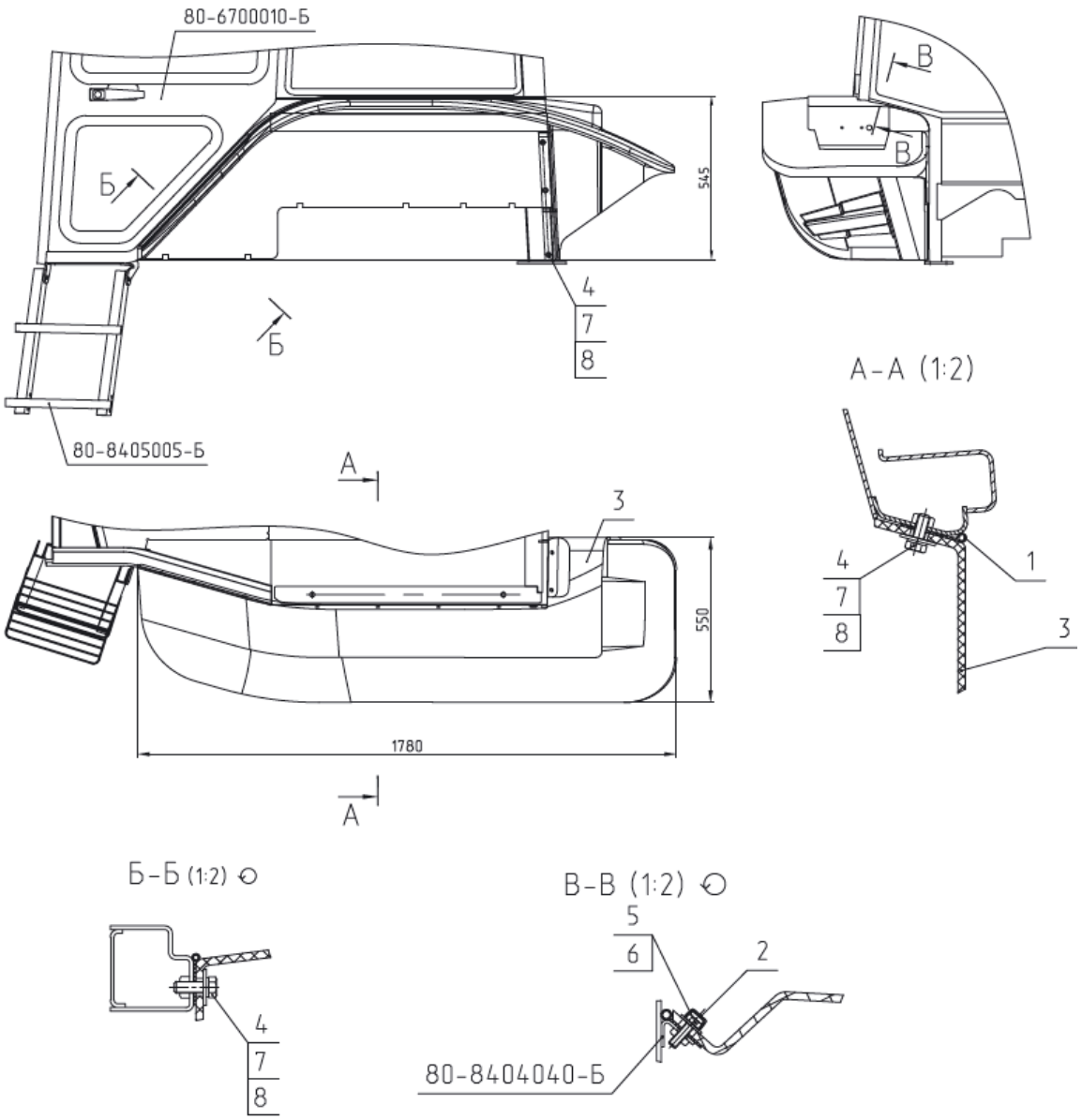

**Figure 8.9**

## 8.6 Disassembly-assembly of rear wheels' fenders

### 8.6.1 Disassembly-assembly of plastic fenders of tractors' rear wheels

To dismount fender do the following:
a) take cups (2) off bolts (5) (figure 8.10);
b) unscrew bolts (4) and (5);
c) remove bolts (4), (5) with washers (6), (7) and (8);
d) dismount fender (3) and sealant (1).
Mounting is made in reverse sequence.
a) on cabin 80-6700010-B snug up fender (3) by means of bolts (4) and (5) and washers (6), (7) and (8);
b) between cabin and fender (3) put sealant (1);
c) tighten bolts (4) and (5);
d) drive cups (2) on bolts (5) (2).

Make mounting and dismounting of right-side fender in the same sequence, as for the left-side one.




1 – sealant; 2 – cup; 3 – fender; 4 – bolt M8-6gx20.88.35.019 State Standard GOST 7796-70; 5 – bolt M6-6gx20.88.35.019 State Standard GOST 7798-70; 6 – washer C6.01.019 State Standard GOST 6958-78; 7 – washer C8.01.019 State Standard GOST 6958-78; 8 – washer 8Л Industry Standard OCT 37.001.115-75.

**Figure 8.10** Installation of rear wheels' plastic fenders

**8.6.2 Disassembly-assembly of metal fenders of tractors' rear wheels**

a) unscrew nuts (13) and remove plate (6), spring (4) and mud guard (1) (Figure 8.11);
b) remove cups (7) from bolts (9);
c) unscrew bolts (9), (10), (12) and remove flap (18);
d) unscrew bolts (12) and remove fender (19) together with sealant (3);

Make assembly in reverse sequence:

a) on cabin snug up fender (19) by means of bolts (12) and washers (15) and (17);

b) snug up flap (18) on cabin by means of bolts (9), (12) and washers (14), (15) and (17);

c) connect fender (19) and flap (18) by means of bolts (10), nuts (13), washers (14) and (16);

d) between cabin and fender (19) put sealant (2);

e) between cabin and flap (18), as well as fender (19) and flap (18) put sealant (3);

f) tighten bolts (9), (10) and (12);

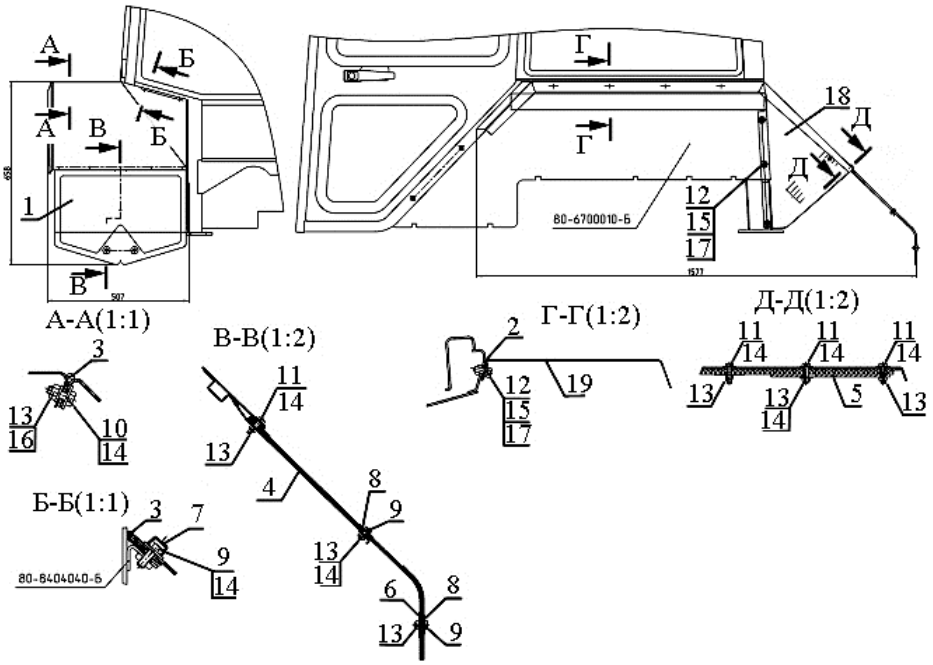
g) drive on bolts (9) cups (7);

h) on flap fastem mud guard (1), spring (4) and plate (5) by means of bolts (11), nuts (13) and washers (14);

g) connect spring (4) with mud guard (1) by means of bolts (9), nuts (13), washers (8) and (14);

j) fasten plate (6) on mud guard (1) by means of bolts (9), nuts (13) and washers (8).

Make mounting and dismounting of right-side fender in the same sequence, as for the left-side one.



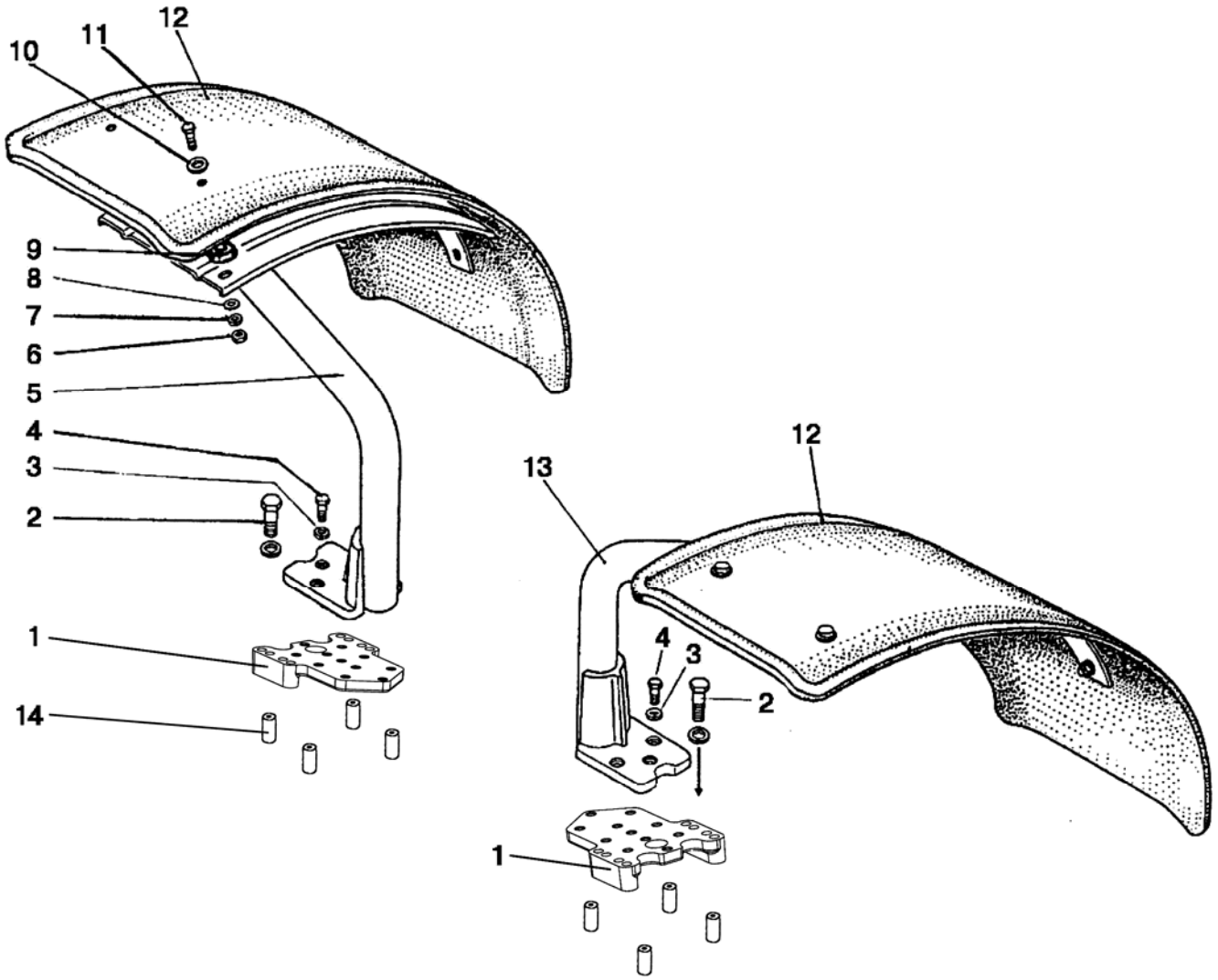

1 – mud guard; 2 – sealant; 3 – sealant; 4 – spring; 5 – plate; 6 – plate; 7 – cup; 8 – washer; 9 – bolt M6-6gx16.88.35.019 State Standard GOST 7798-70; 10 – bolt M6-6gx20.88.35.019 State Standard GOST 7798-70; 11 – bolt M6-6gx25.88.35.019 State Standard GOST 7798-70; 12 – bolt M8-6gx20.88.35.019 State Standard GOST 7796-70; 13 – nut M6-6H.6.019 State Standard GOST 5915-70; 14 – washer C6.01.019 State Standard GOST 6958-78; 15 – washer C8.01.019 State Standard GOST 6958-78; 16 – washer C8.01.019 State Standard GOST 11371-78; 17 – washer 8Л Industry Standard OST 37.001.115-75.

**Figure 8.11** Installation of metal rear wheels' fenders.

## 8.7 Disassembly-assembly of front wheels' fenders of tractors BELARUS-1221 and modifications

a) unscrew bolts 11 (Figure 8.12) and remove fenders 12;
b) unscrew bolts 4 and remove posts 5 and 13;
c) unscrew bolts 2 and remove supports 1 and bushings 14.

Make assembly in sequence reverse to disassembly.
Follow the same order of mounting and dismounting right-side fender.




1 – support; 2 – bolt; 3 – washer; 4 – bolt; 5, 13 – post; 6 – nut; 7 – washer; 8 – washer; 9 – roller; 10 – washer; 11 – bolt; 12 – fender.

**Figure 8.12** Installation of front wheels' fenders with FDA-822 (long beam).

## 8.8 Dismounting-mounting of air conditioner (option) mounted on tractors BELARUS-1221.3/1221.4

**ATTENTION!** Any works that involve disconnection of cooling loop elements, must be performed by trained personnel and use special equipment for maintenance of air conditioners. When set of quick-connecting connections BRS-81 is available, cooling loop can be disconnected without pumping out cooling agent. Even non-operational system maintains high pressure!

Air conditioning system is filled with cooling agent R 34 a. It doesn't erode ozone layer, is not toxic, not poisonous in small quanities, still when in contact with open flame it decomposes and emits poisonous gas – fluorine hydride. Under normal conditions temperature of agent boiling is $27^0$ C. If liguid cooling agents contacts skin it instantaneously evaporates, and this may cause thermal burn.

**IMPORTANT:** Only specially trained personnel can be admitted for maintenance and repair of air conditioning system elements**.**

**ATTENTION!** The engine cooling system can be filled only with non-freezing fluid.

To dismount air conditioning system from tractor do the following (figures 8.13, 8.14):

a) dismantle sealing rings 80-3723045-01 (1), which fasten hoses of air conditioner to tractor parts;

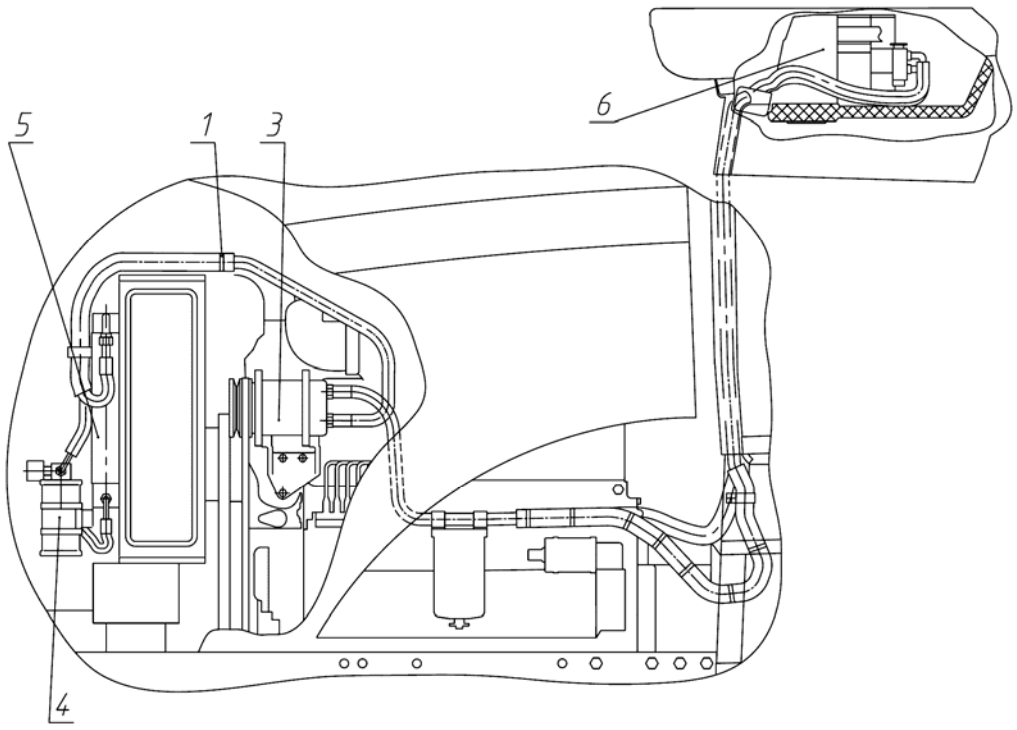



**Figure 8.13** Dismounting air conditioner from engine MMZ.

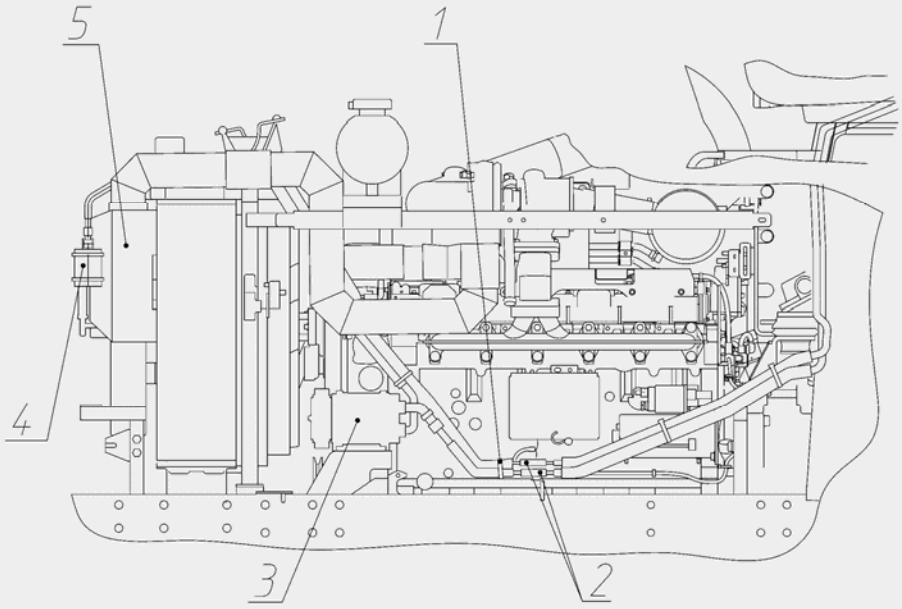



**Figure 8.14** Dismounting air conditioner from engine Deutz.

b) if set of quick-connecting connections BRS-81 (2) is available, undock cooling loop by means of wrenches “S29” and “S30”.

c) while preventing connection pipes (fittings) of air conditioner hoses from unwinding, dismount compressor (3), filter-dehydrator (4) and condenser (5).

d) filter-dehydrator (4) is dismounted by loosening collars that fasten it.

e) to dismount condenser (5) unscrew four nuts that fasten it to arms.

f) heater-cooler (6) is nor dismounted, as half-clutches of the set of quick-connecting connections BRS-81 (2) can not be passed between cabin posts.

g) if the set of quick-connecting connections BRS-81 (2) is not available, after cooling agent is discharged from the system, the disassembly of air conditioning system can be made in any sequence and requires no special directions.

h) dismantling of heating system after draining fluid from engine heating system requires no special directions.

**To drain cooling fluid from diesel heater and cooling system** do the following:

a) place tractor on horizontal terrain;

b) remove expansion tank plug, open drain cocks of radiator, diesel block of cylinders and heater,

c) take heater hose off the valve.

**After filling the cooling system with cooling fluid:**

a) start diesel and without opening the valve let diesel operate at middle speed to heat cooling fluid in the cooling system up to 70-80°C, and after that open the valve, increase diesel rotation speed and let it operate for 1-2 minutes until heater radiator is filled with fluid;

b make sure fluid is circulating through the heater;

c) Heater radiator must be be warmed up;

d) level of cooling fluid in the radiator of diesel cooling system must drop down;

e) fill radiator of diesel cooling system with cooling fluid up to required level (up to mark «MAX» on the expansion tank).

Air condition system is assembled in reverse sequence.

After assembly of air condition system make adjustment of tension of belts of air conditioner compressor drive.

## 8.9 Check and adjustment of tension of the belt of air conditioner compressor drive

**Check of tension of the belt of air conditioner compressor drive:**

Tension of belt 1 (figures 8.15, 8.16) of air conditioner compressor drive is considered normal if sag of its branch “engine crank shaft pulley – compressor pulley” measured in the middle is in the range of 4…6 mm upon appliacation of force (39 + 2.0) N perpendicular to middle of the branch.

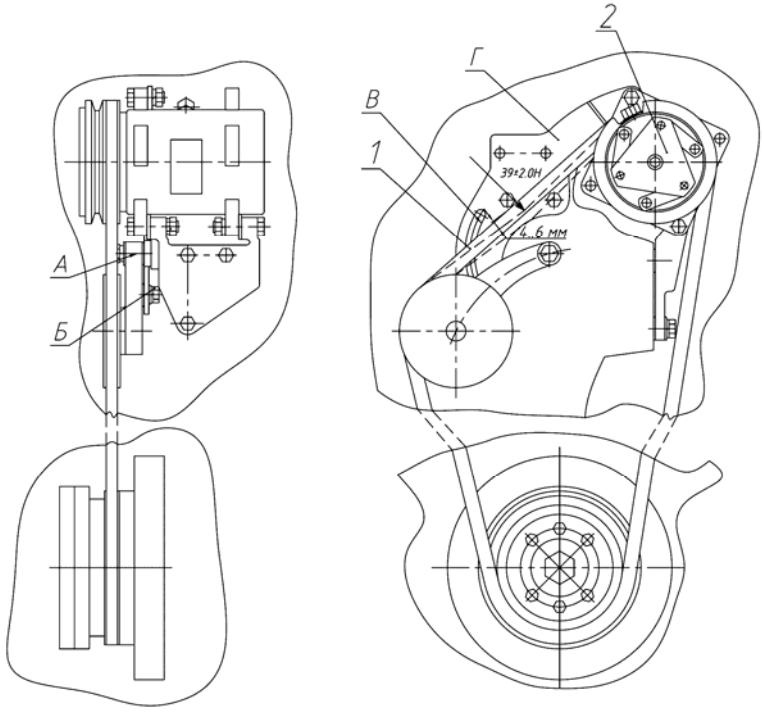



**Figure 8.15** Check and adjustment of tension of the belt of air conditioner compressor drive of diesel MMZ.

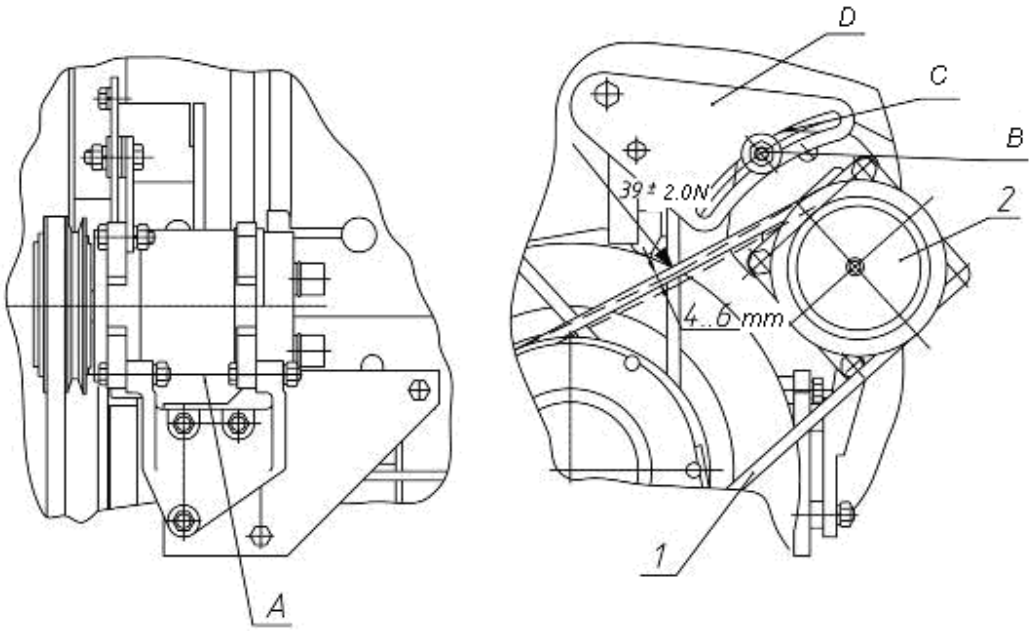



**Figure 8.16** Check and adjustment of tension of the belt of air conditioner compressor drive of diesel Deutz.

**Adjustment of tension of the belt of air conditioner compressor drive:**

Adjustment of belt tension (1) **(**figures 8.15, 8.16**)** must be made by turning compressor on rotation axle “A” and clamping threaded connection “B” in groove of sector “B”. After adjustment of belt, sag upon effort of (39 + 2.0) N, applied perpendicular to middle of branch must be within range from 4 to 6 mm.

## 9 HYDRAULIC HINGE SYSTEM

### 9.1 Disassembly-assembly of hydraulic hinge units.

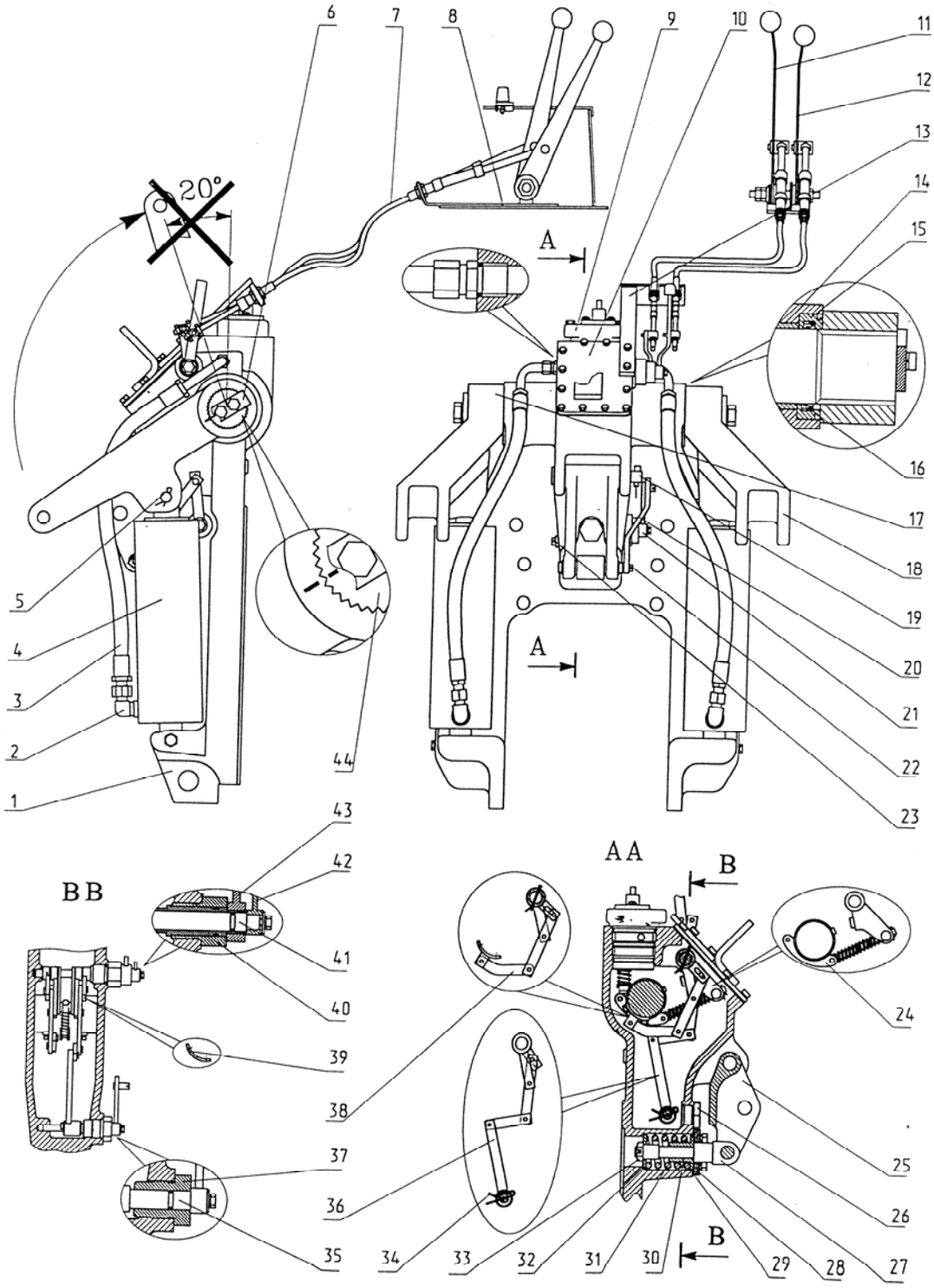



**Figure 9.1**

**Disassembly-assembly of hydraulic hoist** (without dismounting it from tractor)

1) lower the hinge to extreme bottom position;
2) drain oil from body 1 of hydraulic hoist (Figure 9.1), gavong unscrewed drain conical plug 23 on the left side of hydraulic hoist;
3) unpin pin and disconnect ropes 7 from power 43 and position 42 levers;
4) unscrew two bolts for fastening arma 13 to body 1 and cover 10;
5) take arm with ropes aside;
6) unscrew two bolta for fastening distributor to body of hydraulic hoist 1 and using mounting tool push distributor out of body;
7) dismount cylinders by unscrewing lower nuts of hoses 3, bolts for fastening cylinders to lower section of body 1 of hydraulic hoist;
8) unpin and remove pins 5 for fastening cylinders to left- 17 and right-side 18 swivel levers.

**ATTENTION!** To avoid damage of parts after dismounting both cylinders, when distributor is installed inside body, lifting of swivel levers in zone less than 20° of vertical is not allowed.

9) unpin and remove power tie-rod 20;
10) remove shackle 25, having first removed pins 19 and 22;
11) unscrew four bolts for fastening cover 28 of power sensor;
12) remove adjusting shims 29;
13) pull power sensor assembly out of body;
14) unpin and unscrew nut 33 of power sensor;
15) remove from rod washer 32, spring 31, bushing 30 and cover 28;
16) unscrew other ten bolts for fastening cover 10 to body 1;
17) taking care not to damage spacer remove cover;
18) unscrew bolt for fastening position 42 and power 43 levers and remove levers;
19) remove cotter pin, fastening position link 38 to upper roller 41 (extreme left lever);
20) pull roller 41 out of body;
21) unscrew four bolts for fastening swivel levers 17 and 18 to swivel shaft (two for each) and remove retainer washers 6;
22) check alignment of marks on end faces of shaft and (during factory adjustment levers could be reinstalled and marks may not coinside; in this case use chisel put your own marks on levers) and remove levers;
23) using screwdriver extract from openings of body 1 shells 15 with collars 16, and to avoid damage lips of sealing collars when turning them around axis, remove them from shaft;
24) unscrew plug 26;
25) using wire hook or narrow pliers pull out figure cotter pin 34;
26) push off body lower roller 35 together with lever 21;
27) pull out power link 36, pushing it along bushing 40 inside body 1;
28) having turned shaft 44 to convenient position, unscrew two bolts for fastening position link 38 to shaft, extract it from body;
29) remove limiter 39, having unscrewed two bolts for its fastening to swivel shaft 44;
30) holding summing link 24, take swivel shaft from body and extract summing link;
31) unscrew top 40 and bottom 37 bushings.

**Hydraulic hoist is assembled** in reverse sequence.

Before assembly sheck state of all sealing elements, rings 16 pressed in shells in particular, three rubber and four plastic rings in distributor grooves – twisting of rings and their mechanical damage (cuts, cracks, delamination) are not allowed, lubricate sealants and surfaces that contact them during assembly, with fat grease.

Measure diameter of four bushings 14 (Figure 9.1) and adjacent diameters of swivel shaft sections 44, maximum difference of diameters must not exceed 0.5 mm. If necessary, press out and replace bushings or shaft. When replacing left- 17 and right-side 18 swivel levers put on new levers new marks corresponding to marks you made on removed parts.

**When mounting distributor:**

a) to avoid damage of control valve before mounting distributor put distributor against body of hydraulic hoist so that fixing openings in distributor and body of hydraulic hoist were about to coinside;

b) insert distributor inside body of hydraulic distributor, put fastening bolts;

c) one by one keep tightening fastening bolts until clearance between mounting places of hydraulic hoist body and distributor fully disappears.

**ATTENTION!** Excessive tightening of fastening bolts can lead to jamming of distributor control valve.

Pay attention if assembly and adjustment of power sensor (if it was disassembled) were made right):

a) tighten nut 33 of power sensor until axial clearance between support turn of spring 31 and adjacent parts is closed;

b) keep screwing nut until its cuts coinside with cotter pin opening;

c) insert cotter pin in opening of rod 27, so that its long tendril was on the side of rod threaded end face, and bend this tendril to end face surface;

d) after assembled and adjusted power sensor is inserted inside opening of hydraulic hoist body, put bolts, press its cover to body with hand, and fill clearance between them on left and right sides with adjustment shims, difference in the number of spacers on the left and right sides must not exceed one piece;

e) tighten bolts, check axial play of rod – it must not exceed 1 mm.

**Replacement of damaged rubber rings** (without complete disassembly of hydraulic hoist):

- **on top bushing 40** (Figure 9.1) (leakage between bushing and body 1) and on hollow roller of power link 36 (leakage between bushing 40 and power lever 43):

a) unpin and disconnect ropes 7 from levers 42 and 43, having unscrewed fastening bolt on roller end face 41, dismount levers;

b) unscrew bushing 40;

- **on top roller 41** (Figure 9.1) (leakage between levers 42 and 43):

a) unpin and disconnect corresponding rope 7 from position lever 42;

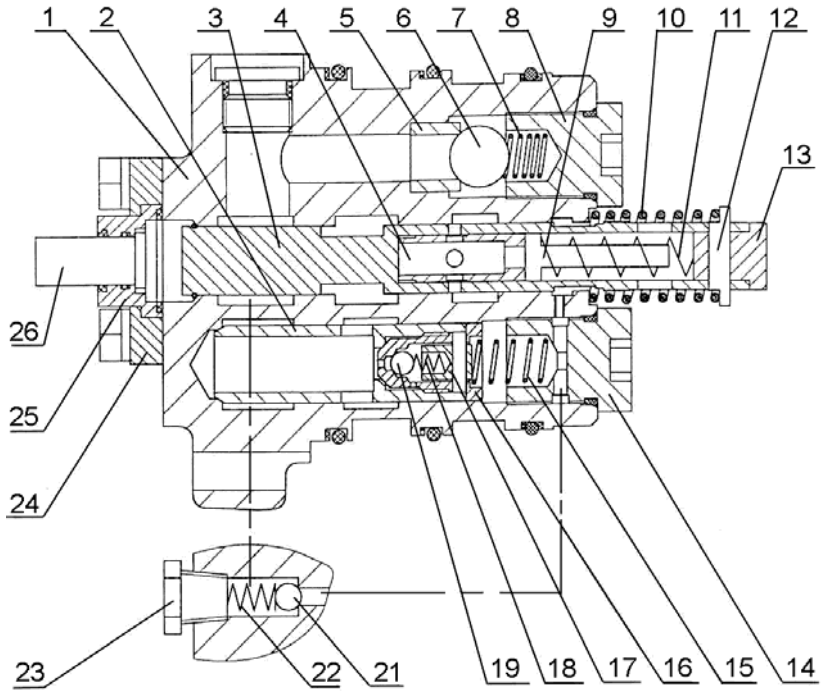
b) remove cover 10 of hydraulic hoist, having unscrewed bolts that fasten it;

c) remove cotter pin on roller 41, that fastens position link 38;
d) pull out roller 41 holding position lever 42, until sealing rings doesn't go out of hollow roller of power link 36;
e) remove position lever, having unscrewed fastening bolt;

- **on bottom bushing 37** (Figure 9.1) (leakage between bushing and body) and on bottom roller 35 (leakage between bushing and lever 21):
a) unpin and remove from lever 21 front end of power tie-rod 20;
b) dismount lever, having unscrewed fastening bolt on end face of roller 35;
c) unscrew bottom bushing 37;
d) pull roller 35 until ring goes out of body.

**Works to be performed on dismounted hydraulic hoist distributor.**

**Disassembly of control valve:**
a) press return spring 10 (Figure 9.2) on control valve 3 towards body 1 to release stop pin 12, and extract it from opening in control valve, taking measures that inside spring 11 didn't "shoot" with its thrust 13 on the control valve end;




1 - body, 2 – relief valve, 3 – control valve, 4 – retarding valve, 5 -seat, 6 - ball 14,288 мм, 7 – reference valve spring, 8 – reverse valve plug, 9 - thrust, 10-control valve spring, 11 – retarding valve spring, 12 - pin, 13 - thrust, 14 – relief valve plug, 15 – relief valve spring, 16 – cut-off valve body, 17 – guide bushing, 18 – cut-off valve spring, 19 - ball 5,556 мм, 21 - ball 5,556 мм, 22 – balancing valve spring, 23 – conical plug, 24 - cover, 25 – pusher bushing, 26 - pusher.

**Figure 9.2** Distributor device

b) extract spring 11, thrust 9 and retarding valve 4;

c) unscrew two bolta for fastening cover 24, remove cover as an assembly with bushing 25 and pusher 26 and extract control valve 3 from the side of removed cover, without removing retaining ring from it;

d) check state of retaining ring put on control valve and control valve itself – deep scratches, mud and foreighn particles in openings and on its surface, wash all dismounted parts with diesel fuel, lubricate with motor or hydraulic oil;

e) insert retarding valve 4 inside control valve 3 with step side forward;

f) check how easily valve 4 moves inside control valve 3,absence of jamming – with valve fully extended through side openings 3 mm in diameter of control valve openings 4 mm in diameter should be visible on the valve, and when striking slightly control valve end face against hard surface the valve should pop out of the control valve;

g) put control valve with stop ring, but without retarding valve, from top side (on the side of the cover) inside the body, check easiness with which in axially moves – control valve inside body must move under its own weight or at light shaking ov the body with control valve;

h) mount cover 24 as an assembly with bushing 25 and pusher 26, having checked state of rubber rings and mud retainer inside bushing 25;

j) put retarding valve 4, thrust 9, spring 11 and having compressed spring with thrust, insert stop pin 12 inside opening of control valve 3 and thrust 9, so that flats on the pin faced the body;

i) using screwdriver push support turn of spring 10, put it under flats of stop pin 12, and screw spring on control valve until the second support turn goes under flats of of stop pin;

k) press the end face of control valve (with effort 15 kgf) and then release it, jamming of control valve inside body is not allowed, total travel of control valve should be at least 8 mm.

**Disassembly of relief and cut-off valves:**

a) unscrew plug 14 (Figure 9.2) on lower distributor end face (relief valve 2 can be seen through side opening the second lowest end face groove of body of the distributor body);

b) extract spring 15;

c) extract relief valve 2;

d) unscrew cut-off valve 16, holding from rotation of valve 2 by means of metal rod 4-7 mm in diameter put in its side openings;

e) using wire 1-3 mm in diameter push stop pin out of cut-off valve body;

f) extract guide bushing 17, spring 18 and ball 19;

g) wash all parts in diesel fuel;

h) check state of sealing edge in body 1 (90 mm deep) – it should be free of cavities, cracks, foreign particles, if necessary grind relief valve to this edge using fine-particle abrasive paste;

ij) check absence of foreign particles in jet openings with 1.8 mm in diameter along axle, and 1.3 mm in diameter along side surface of cut-off valve body 16;

j) check state of sealing edge of cut-off valve (for balls) – it should be free from foreign particles, cavities, the ball track must be continuous along entire edge perimeter;

k) if necessary, mint the ball to seat with hammer strike having mass 0.15-0.25 kg;

l) put inside cut-off valve body 16 ball 19, spring 18 and guide bushing 17;

m) while pushing guide bushing align its side opening with side openings in cut-off valve body, put stop pin;

n) screw cut-off valve 16 inside relief valve 2, putting on thread surface a drop of oil resistant paint or sealant;

o) insert relief valve 2 inside body 1 of distributor, check how easily it rotates inside body – movement must take place under its own weight or upon light touch of little finger of hand;
p) put spring 15 and screw plug 14, having checked state of rubber sealing ring on it;
q) check operation of relief valve 2, by pulling valve by visible in side body opening using prickle or narrow screwdriver, and then sharply releasing it. The valve must return to initial position with click (strike against sealing edge).

**Disassembly of reverse valve:**

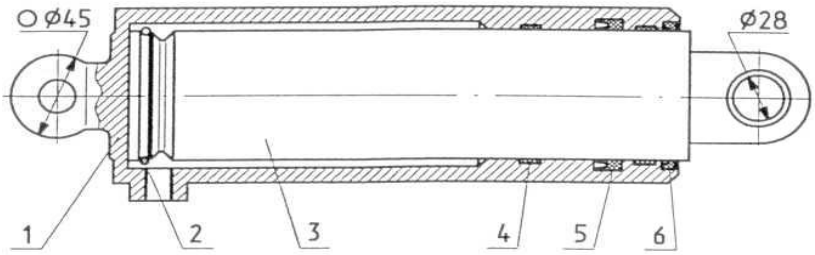
a) unscrew plug 8 (Figure 9.2) (ball 6 of reverse valve is seen through side opening in the first lowest distributor end face groove);
b) extract spring 7 and ball 6;
c) wash parts in diesel fuel;
d) check state of valve seat; its sealing should be free of cracks, foreign particles,ball track must be continuous along entire edge perimeter;
e) if necessary, mint the ball to seat with hammer strike having mass 0.15-0.25 kg;
f) put spring 7 and screw plug 8, having checked state of rubber sealing ring on it;
g) using prickle or narrow screwdriver check mobility of reverse valve ball: it should part from seat by at least 2 mm and return back without jams upon tool removal.

**Disassembly and inspection of balance valve:**

a) unscrew conical plug 23 (Figure 9.2) on top end face of distributor;
b) extract spring 22 and ball 21;
c) check state of sealing edge inside body above ball. If necessary, mint the ball to seat with hammer strike having mass 0.15-0.25 kg is allowed. If deep cavities are present edges can be corrected by deepening the opening by 0.5-2 mm using drill 7.8-8.4 mm in diameter at summit not less than 120 degrees and minting. The resulding chips must be removed completely.

**Disassembly and assembly of plunger cylinders:**

a) put cylinder in bench vice, carefully squeezing its body 1 (Figure 9.3) so that through the opening cylinder cavity could be seen;
b) move plunger 3 of cylinder in such position (with plunger almost entirely extended), that stkop ring 2 on it and adjacent groove were opposite feeding opening;




1-body, 2-stop ring, 3-plunger, 4-guide ring
5-collar, 6-mud retainer.

**Figure 9.3** Plunger cylinder design:

c) turn plunger around axis so that cut on the stop ring faced the opening;
d) put screwdriver inside opening and place one edge of stop ring inside mounting groove;
e) while retaining the ring inside mounting groove, rotate plunger until stop ring entirely moves inside mounting groove;
f) pull plunger out of body 1.

**During assembly:** perform operations in reverse sequence, having first washed and lubricated all parts, and cheched state of stop ring 2, mud retainer 6, guide rings 4, collars 5 and plunger 3. When inserting plunger inside mud retainer, carefully spread mud retainer jaws across plunger surface, tucking of jaws is not allowed.

Design of cylinders 90 mm in diameter is not described, as they are of piston design, well known in operation and have no any specific design features.

**Adjusting control wire ropes:**

a) disconnect wire ropes 7 (Figure 9.1) from levers 42 and 43;
b) put both levers, 42 and 43, to extreme front positionso that hinge lowered down to fully drawn in position of cylinders 4;
c) using nuts on ropes' shells that fasten them to arm 8 in the cabing side panel, adjust travel of handles 11 and 12 to cover entire zone on panel cover marked with figures;
d) put position handle 12 to mark "9", and power handle 11 to mark "4";
e) turn levers 42 and 43 back until clearances are closed (until resistance of distributor return spring is felt);
f) using nuts that fasten shells of ropes to arm 13, adjust length of free ends of ropes until pins of ropes coinside with openings in levers 42 and 43;
g) insert pins in openings and cotter pin them.

**9.1.1 Disassembly-assembly of hydraulic system assemblies**

**Dismounting-mounting of distributor RP 70-1221:**

a) disconnect control tie-rods 1 (Figure 9.4), 2 from distributor 3;

b) disconnect from distributor (3) pressure oil line (4), oil lines of outlets 5, 6, 7, 8, 9, 10, drain oil line 11;

c) to avoid ingress of foreign particles inside cavity of oil lines wrap ends of all removed oil lines with polyethylene and put them on clean surface;

d) unscrew three nuts (12) that fasten distributor arm (13) to oil tank (15) and dismount distributor (3) together with arm (13;

e) unscrew four bolt (14) that fastens distributor (3) to arm (13).

Install distributor on oil tank in reverse sequence.

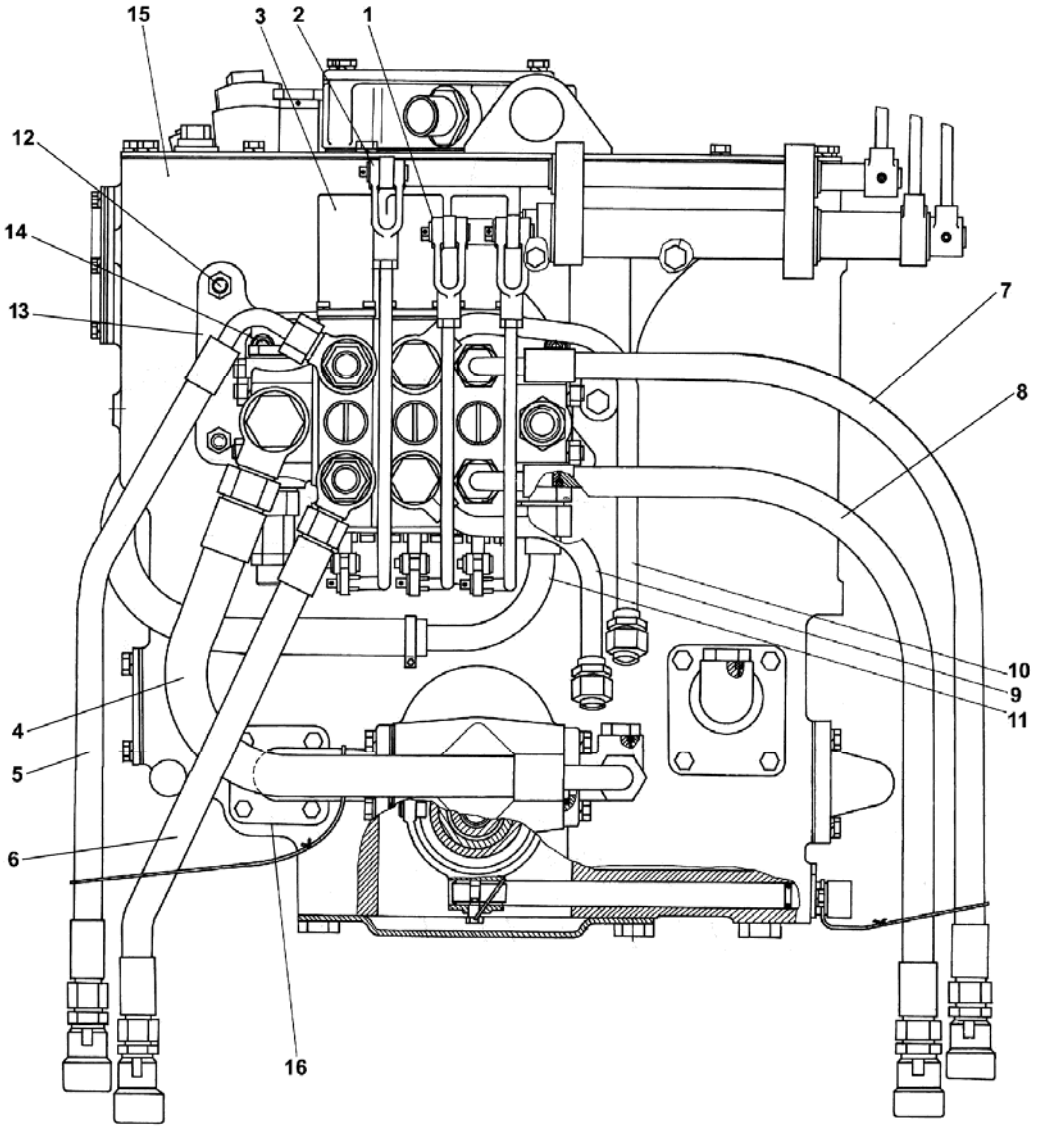



**Figure 9.4**

**Disassembly-assembly of pump drive on oil tank dismounted from tractor:**

a) disconnect from pump suction branch pipe (16) and pressure conduit (4) (Figure 9.4);
b) unscrew bolts 2 (Figure 9.5) and nuts 13 for fastening pump 1 to oil tank 17 (Figure 9.6);
c) dismount pump 1 (Figure 9.5) and spacer 3;
d) unpin bolt 14 (Figure 9.6) that fastens yoke 15 on shaft 16 and unscrew it;
e) while supporting yoke (15), pull out shaft (16) with handle and yoke 15;
f) screw two disassembly bolts inside flange of cup 5 (Figure 9.5) and pull out cup with spacer 4;
g) pull drive out of oil tank;
h) remove from shaft-gear bearings 6;
j) dismount clutch (11) and pull out three balls 10;
i) extract one or two retainer rings 7;
k) pull out bushing 9 and washer 12.

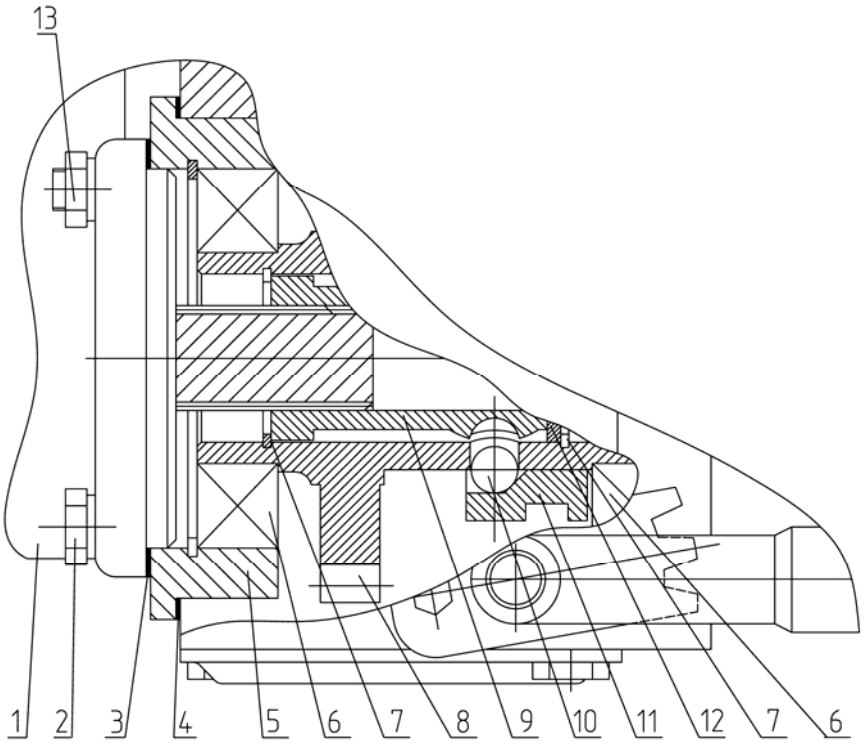



**Figure 9.5**

Make assembly and installation of the drive in sequence reverse to disassembly. Before putting balls (10) align hollows on bushing (9) with openings on shaft-gear

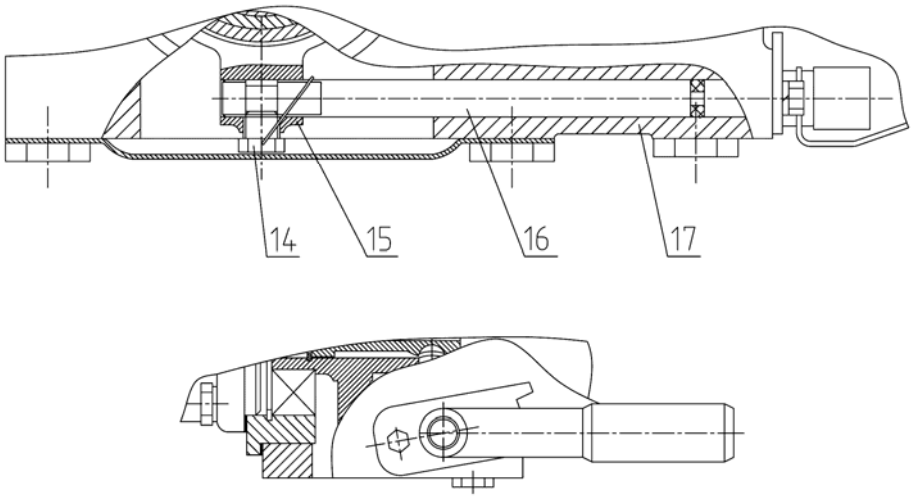



**Figure 9.6**

**NOTE:** If drive is not equipped with handle, yoke 15 (Figure 9.6) on shaft (16) is not fixed, and shaft (16) is fastened by bolt 18 (Figure 9.7) to oil tank 17.

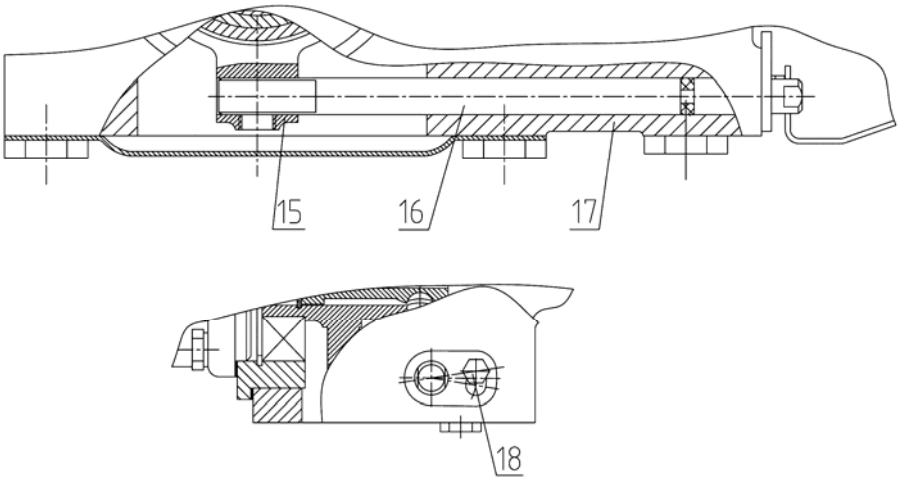



**Figure 9.7**

**Dismounting oil tank of tractor with cabin dismantled (for hydraulic system with distributor RP 70-1221):**

a) put vessel with at least 25 litres capacity under drain bolt (10) in bottom of oil tank (1), unscrew filler plug (4), then bolt (10), and drain oil;

b) dismount gravity drain oil line, comprising hose (3) and pipelines (5) and (8), having first released fastening.

c) disconnect sleeves (13) of right-side rear outlets from pipelines in the area of oil tank, and remove them, having first released fastening.

d) disconnect pressure sleeve (7)from distributor and hydraulic hoist (2) and dismount it, having first released fastening.

e) disconnect collars of drain hose (12) on the oil tank and on hydraulic hoist (2) and remove it having first released the fastening.

f) disconnect sleeves (6) of rear left-side outlets of distributor and remove them, having first released the fastening.

g) disconnect sleeves (6) of rear left-side outlets of distributor and remove them, having first released the fastening.

h) to avoid ingress of foreign particles inside internal cavity of oil lines, wrap up ends of all dismounted oil lines with polyethylene and place them on clean surface.

j) make installation and fastening of dismounted oil lines in reverse sequence

i) unscrew four bolts that fasten oil tank (1) to body of clutch coupling.

k) slightly shake oil tank and, having hooked arm (9) by frame crane, dismount oil tank off transmission.

l) place oil tank on clean surface to avoid ingress of foreign particles on connecting sites of oil lines.

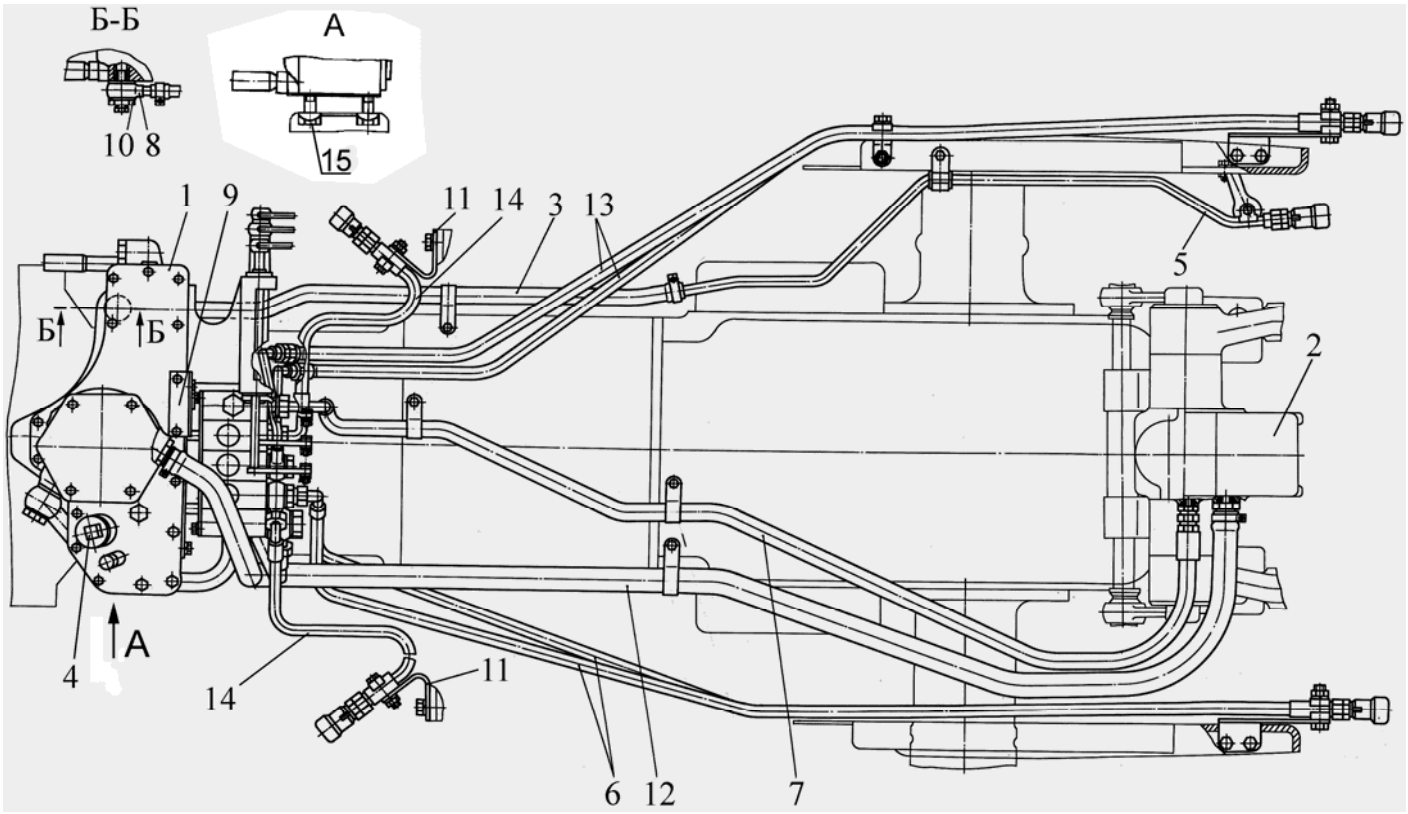



**Figure 9.8**

**Dismounting-mounting of distributor RS 213 Mita:**

a) disconnect control tie-rods 1, 2 from distributor 3 (Figure 9.9);

b) disconnect from distributor (3) pressure oil line (4), oil lines of outlets 5, 6, 7, 8, 9, 10, drain oil line 11;

c) to avoid ingress of foreign particles inside internal cavity of oil lines, wrap up ends of all dismounted oil lines with polyethylene and place them on clean surface.

d) unscrew three nuts (12) that fasten distributor arm (13) to oil tank (15) and dismount distributor (3) together with arm (13;

e) unscrew four bolt (14) that fastens distributor (3) to arm (13).

Install distributor on oil tank in reverse sequence.

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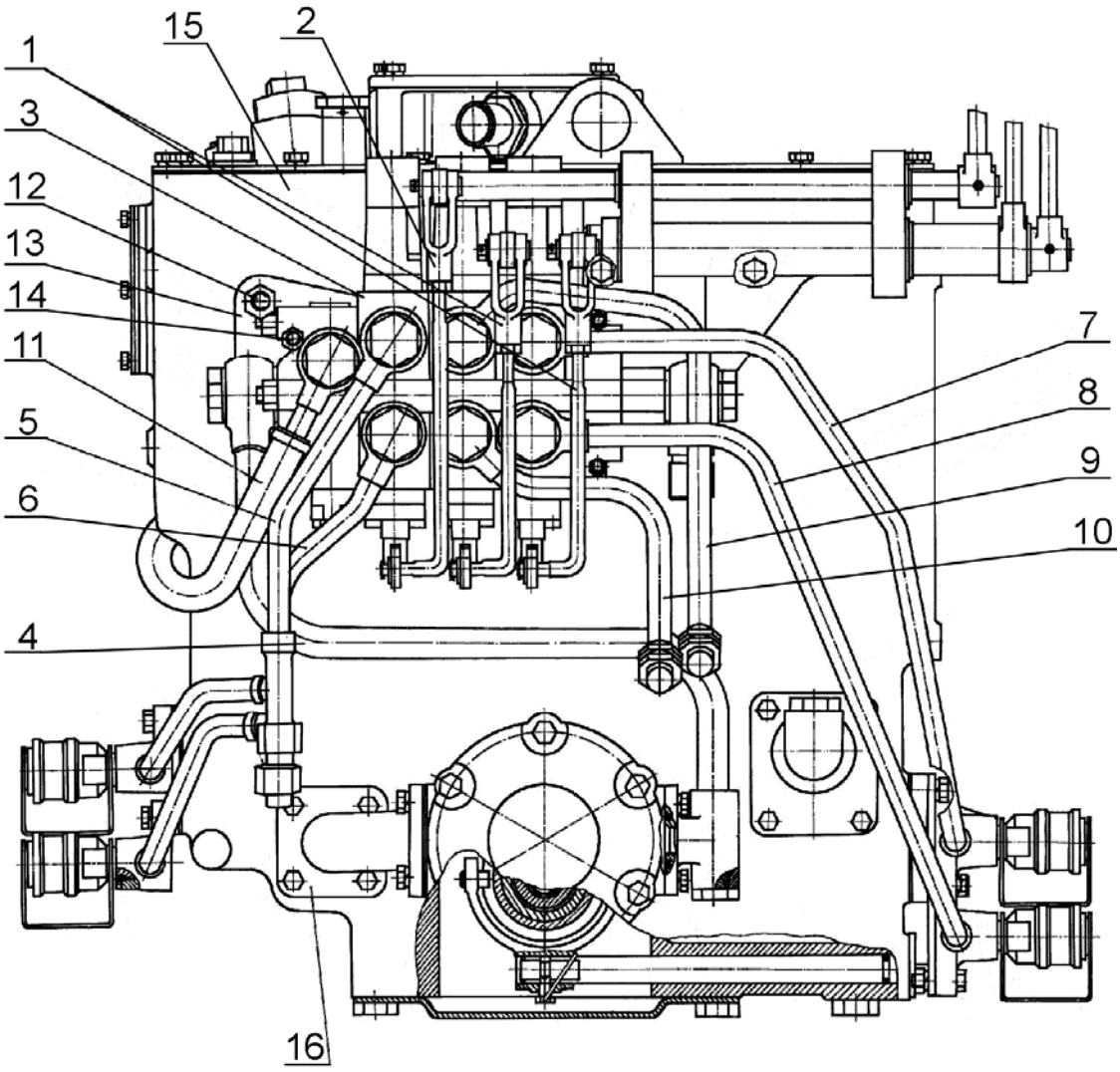



**Figure 9.9**

**Dismounting oil tank of tractor with cabin dismantled (for hydraulic system with distributor RS 213 Mita):**

a) put vessel with at least 25 litres capacity under drain bolt (10) (Figure 9.10) and drain oil in bottom of oil tank (1), unscrew filler plug (4), then bolt (10), and drain oil;

b) dismount gravity drain oil line, comprising hose (3) and pipelines (5) and (8), having first released fastening.

c) disconnect sleeves (13) of right-side rear outlets from pipelines in the area of oil tank, and remove them, having first released fastening.

d) disconnect pressure sleeve (7) from distributor and hydraulic hoist (2) and dismount it, having first released fastening.

e) disconnect collars of drain hose (12) on the oil tank and on hydraulic hoist (2) and remove it having first released the fastening.

f) disconnect sleeves (6) of rear left-side outlets of distributor and remove them, having first released the fastening.

g) to avoid ingress of foreign particles inside internal cavity of oil lines, wrap up ends of all dismounted oil lines with polyethylene and place them on clean surface

h) make installation and fastening of dismounted oil lines in reverse sequence

i) unscrew four bolts that fasten oil tank (1) to body of clutch coupling.

j) slightly shake oil tank and, having hooked arm (9) by frame crane, dismount oil tank off transmission.

k) place oil tank on clean surface to avoid ingress of foreign particles on connecting sites of oil lines.

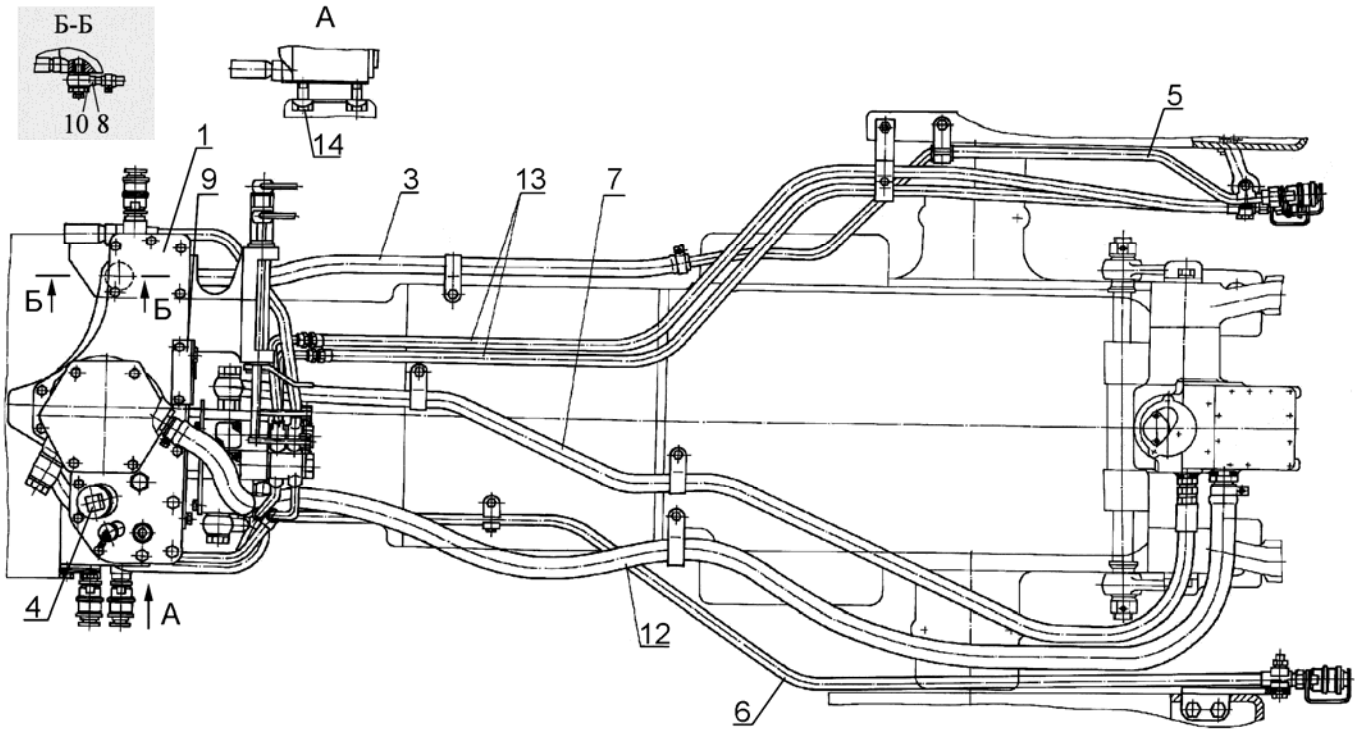
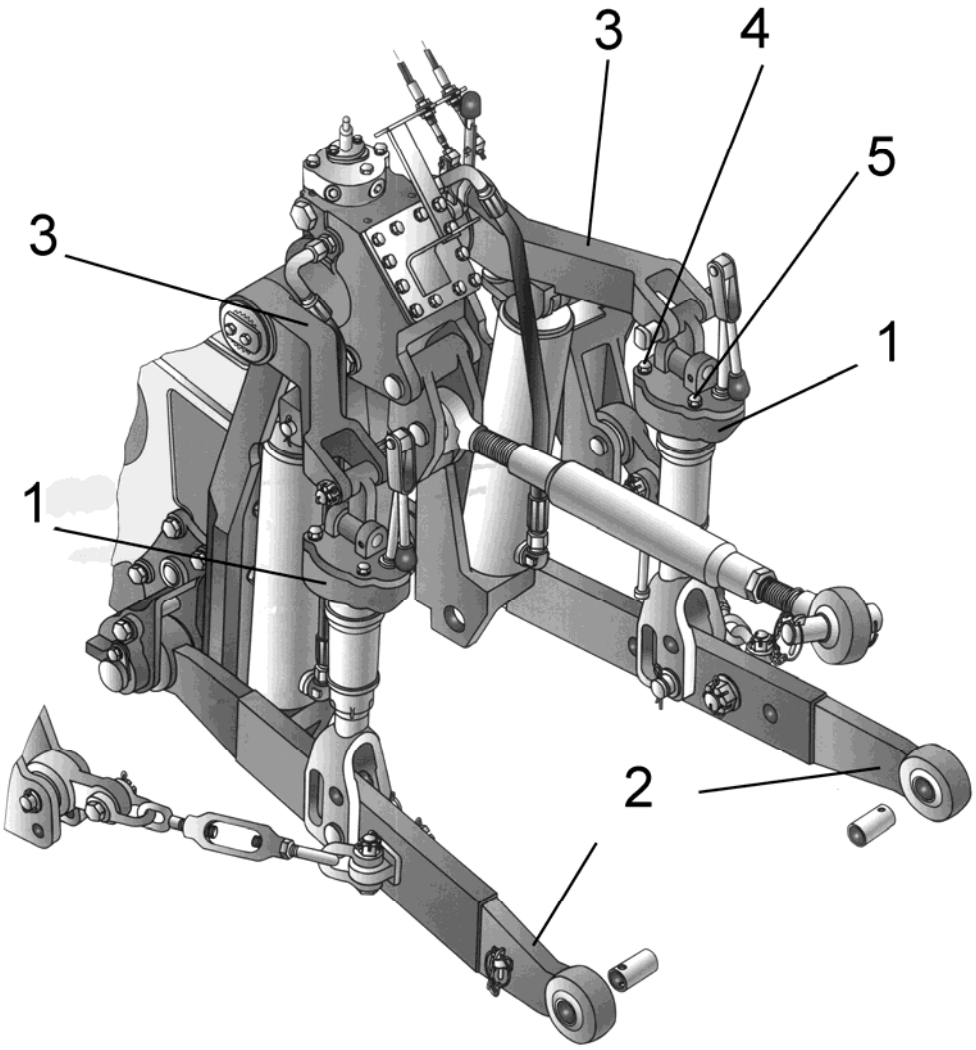



**Figure 9.10**

### 9.2 Disassembly-assembly of rear hinge device (RHD) of tractor equipped with hydraulic hoist

Disassembly and assembly of RHD presents no problems, except for disassembly and assembly of gear braces (1) (Figure 9.11) (see below).




1-braces; 2-lower tie-rods; 3-lifting lever; 4, 5-bolts of brace cover.

**Figure 9.11**

**Disassembly of gear brace:**

a) disconnect brace from lifting lever 3 and lower tie-rod 2 (Figure 9.11);
2) unscrew four bolts 4, 5 (Figure 9.11) and remove cover 2 (Figure 9.12), as an assembly with handle 3;
3) screw yoke 4 (Figure 9.12) inside tube 5, upwards to the end;
4) take apart branches of ring 6 and dismantle it from groove;
5) unscrew yoke 4 together with cap 7 out of tube 5.

Make assembly in reverse sequence.

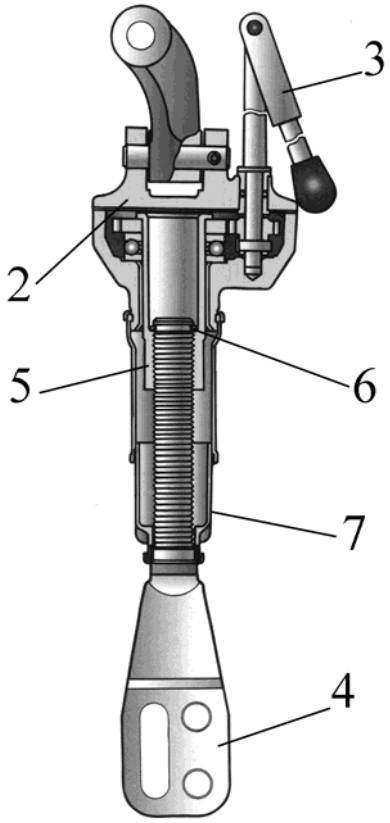



**Figure 9.12** Gear brace.

### 9.3 Disassembly-assembly of lifting type tractive-drawing device (TDD) with hydraulic hoist

Disassembly of TDD is made in the following sequence, see (figures 9.13, 9.14, 9.15, 9.16):

a) remove clip 1 (figures 9.13, 9.15), having first unscrewed nuts 2 (Figure 9.15);
b) pull out pin, having first unscrewed bolts (4) and removed plate 5 (Figure 9.14);
c) remove tie-rod 6 (Figure 9.14);

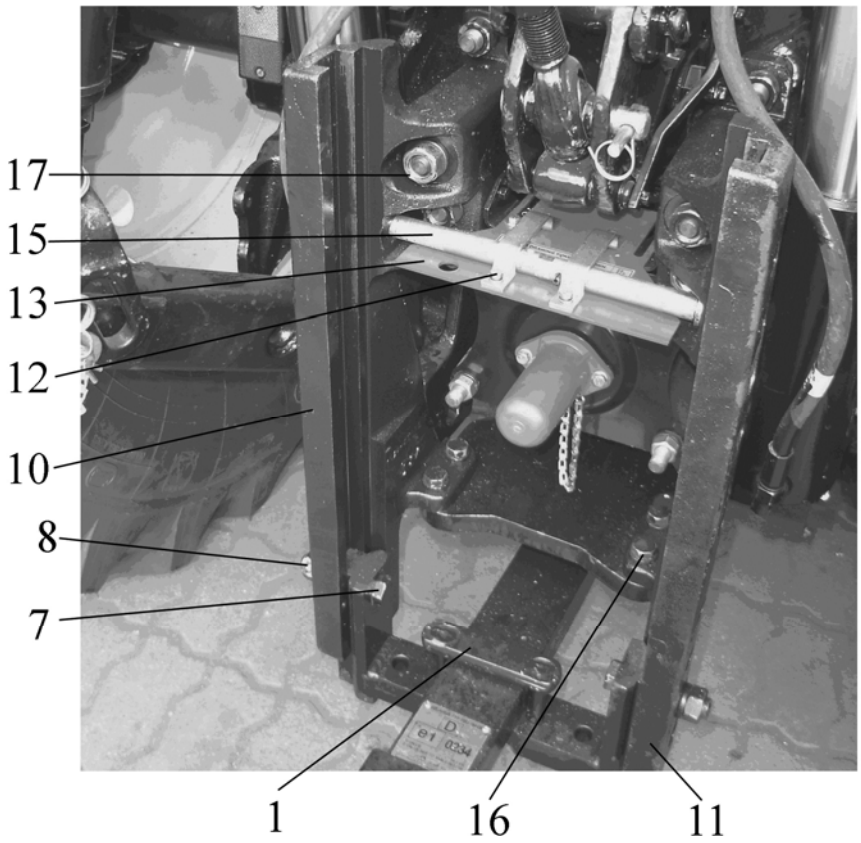



**Figure 9.13**

d) remove pins (7), having unscrewed nuts 8 (Figure 9.13);
e) dismount cross-piece 9 (Figure 9.15) from guides 10, 11 (figures 9.13, 9.16);
f) unscrew bolts 12 (Figure 9.13) and remove guard 13

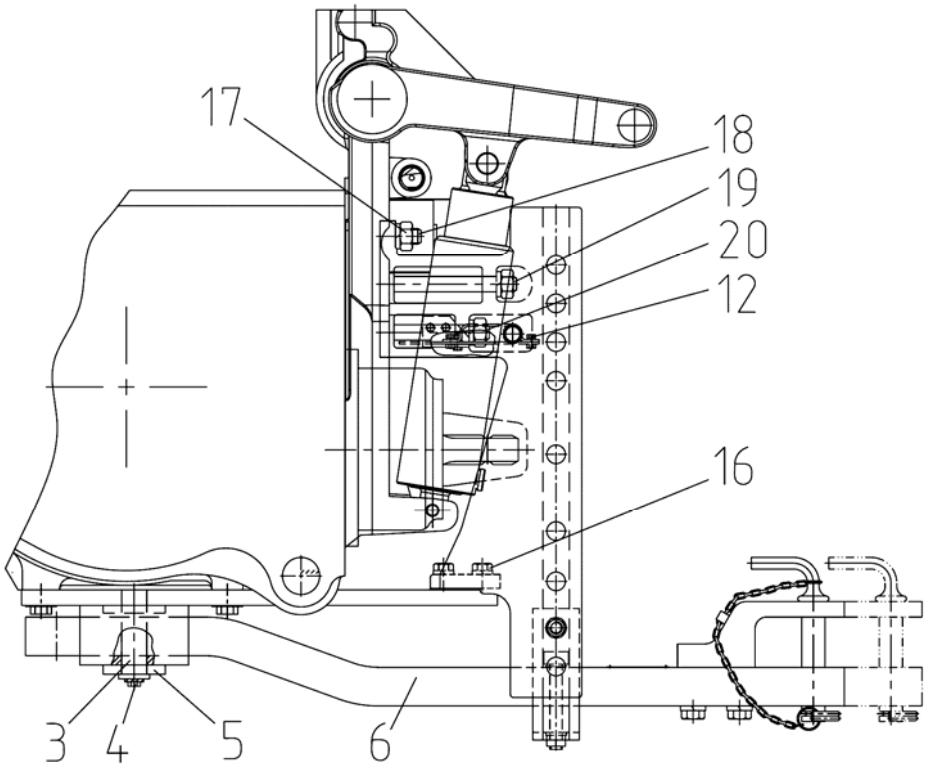



**Figure 9.14**

g) knock out pin 14 (Figure 9.16), screw tie (15) inside left-side guide (10) and, having pulled out bushing (16), remove tie (15) through openings in right-side guide (11), having first screwed it out of left-side guide;

h) unscrew bolts 16 (figures 9.13, 9.14) and having unscrewed nuts 17 off pins 18, 19, 20 (Figure 9.14), remove guides 10, 11 (Figure 9.13).

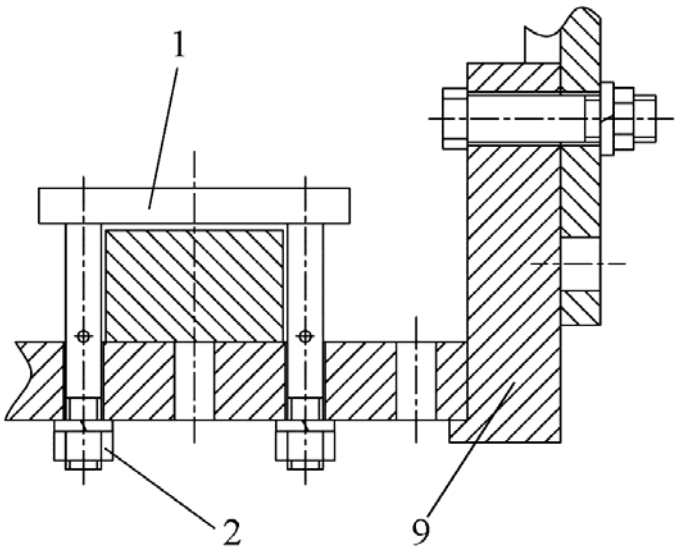



**Figure 9.15**

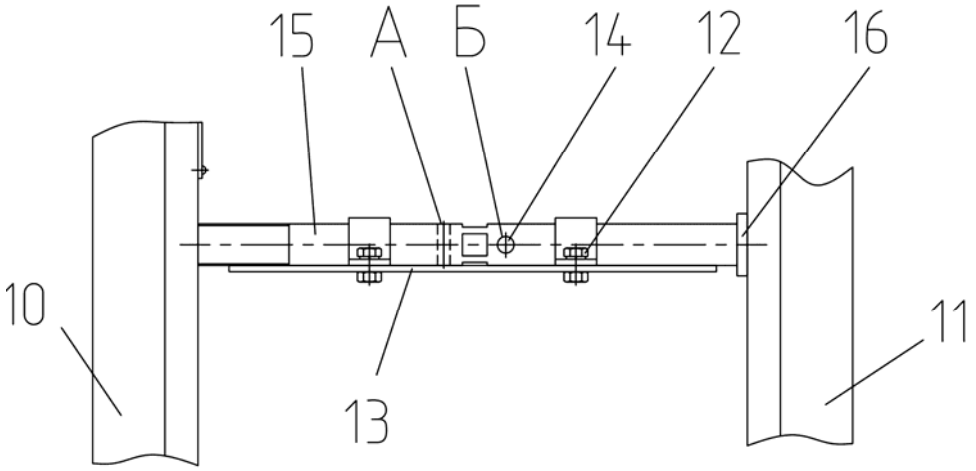



**Figure 9.16**

Make assembly in reverse sequence, and:

a) screw pins 18, 19 and 20 (Figure 9.14) with threaded part with tough thread in rear axle body – **for normal thread, as from the opposite side the flat is increased**

b) when installing tie 15 (Figure 9.16), screw it in left-side guide (10), and having installed bushing (16), unscrew to the end with shoulder inside bushing;

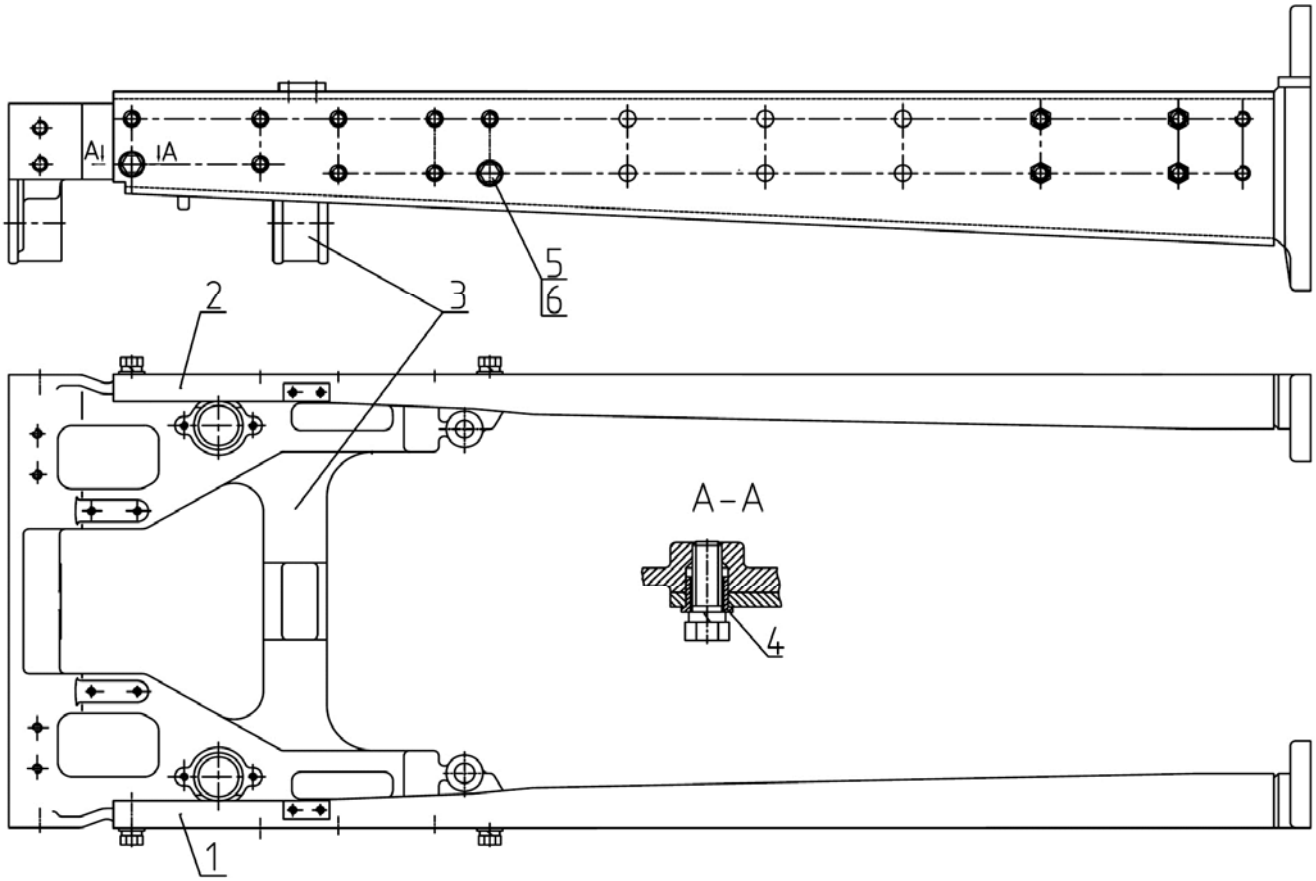
c) after installation of guard (13), to prevent rotation of tie (15), put in one of openings (A or B) pin (14) so that extended symmetrically to tie body

## 10 DISASSEMBLY-ASSEMBLY OF SEMI-FRAME AND BALLAST

### 10.1 Disassembly-assembly of semi-frame of tractors BELARUS-1221.2/1221B.2/1221.3/1221.4

Disassembly semi-frame in the following sequence:
a) unscrew and extract bolts 5 and washers 6 (Figure 10.1);
b) extract bushings 4 and disconnect spars 1 and 2.

Make assembly of semi-frame in sequency reverse to disassembly:
a) put in place spars 1 and 2;
b) insert bushings 4 and screw them up with bolts 5 and washers 6.



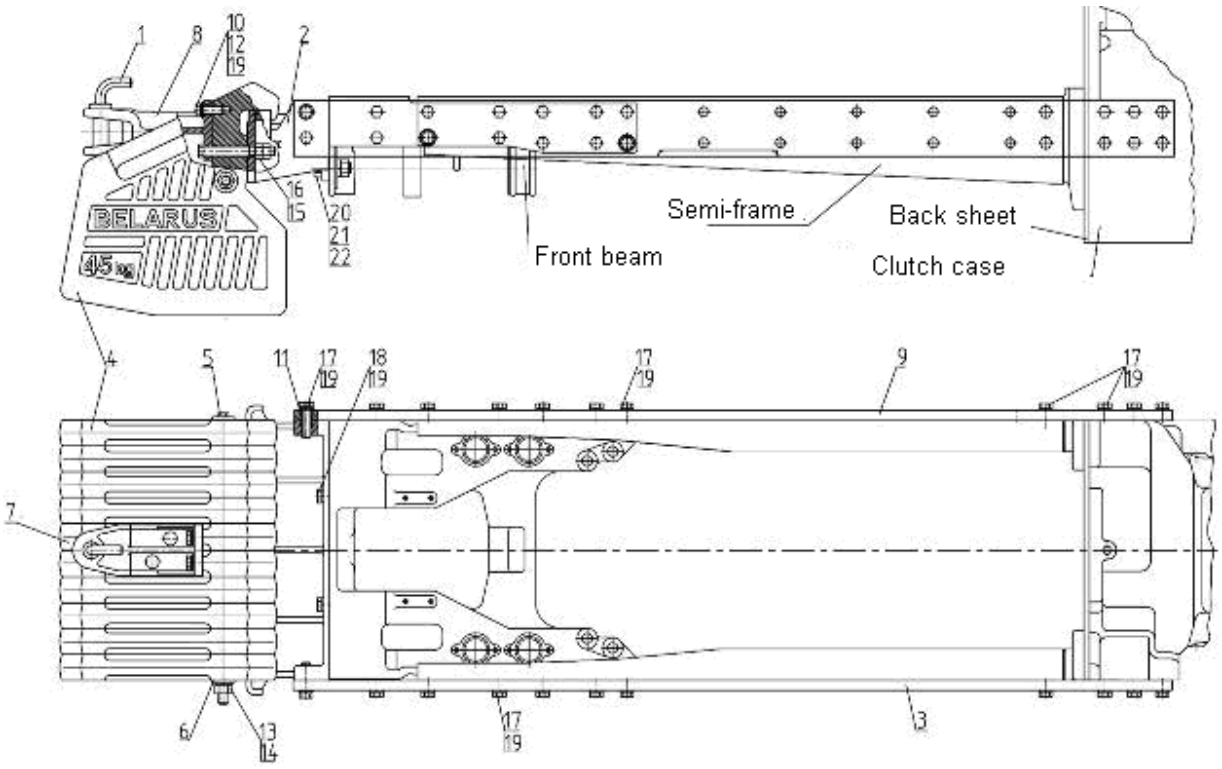

1 – right-side spar; 2 – left-side spar; 3 – front beam; 4 – bushing; 5, 6 – bolts

**Figure 10.1**

## 10.2 Disassembly-assembly of ballast

a) remove string 5, (Figure 10.2), having unscrewed nut 14 with washers 6 and 13;
b) dismount loads 4;
c) unscrew and extract bolts 10 and 16 with washers 12 and 19 and nuts 15;
d) dismount eyelet 8 with pivot 1;
e) dismount loads 7;
f) unscrew and extract bolts 17 with washers 19;
g) pull out bushings 11;
h) remove stripes 3 and 9;
i) unscrew and pull out bolts 18 and 20 with washers 19, 21 and nuts 22;
j) disconnect arm 2.

Assembly ballast in sequence reverse to disassembly:
a) mount arm 2 using bolts 18 and 20 with washers 19, 21 and nuts 22;
b) put in place stripes 3 and 9, insert bushings 11 by screwing up bolts 17 with washers 19;
c) hang loads 7 on arm 2;
d) attach eyelet 8 with pivot 1 and fasten them with bolts 10 and 16 with washers 12 and 19 and nuts 15;
e) hang loads 4 and fasten them with string 5 with washers 6 and 13 and nut 14.



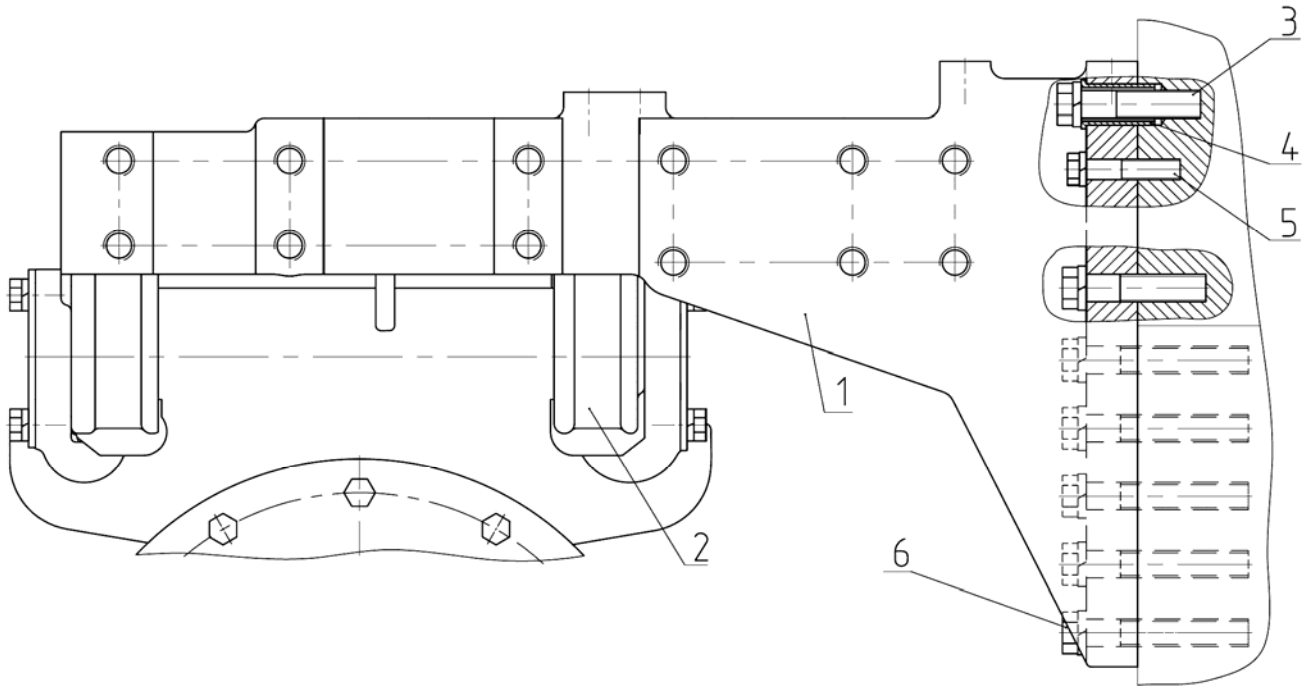

1 – pivot; 2 – arm; 3 – stripe; 4 – load; 5 – string; 6 – washer; 7 – load; 8 – eyelet; 9 – stripe; 10 – pin; 11 – ring; 12 – bolt; 13, 14, 15 – washer; 16 – bolt; 17 – nut; 18 – nut; 19, 20, 21 – bolt

**Figure 10.2**

### 10.3 Disconnection of front beam from engine Deutz

To disconnect front beam (Figure 10.3) from engine do the following:
a) unscrew bolts 3, 5 and 6, that fasten front beam 1 to diesel casing;
b) undock front beam off engine;
c) extract two bushings 4 from beam, if they are easily extracted.

Dock front beam to engine in reverse sequence.




1 – front beam; 2 – bushing; 3 – bolt; 4 – bushing; 5 – bolt; 6 – bolt.

**Figure 10.3**

## 11 ELECTRICAL EQUIPMENT

### 11.1 Dismounting-mounting of elements of the electrical equipment for engines mounted on tractors BELARUS-1221.2/1221B.2/1221.3/1221.4 with engines MMZ и Deutz

Electrical equipment of the engine includes:
a) engine harness, harness of voltage converter (starting system 24 V), bunch of glow plugs, designed for connecting assemblies and elements of the engine in its electrical part;
b arms with boxes of fuses and relay of glow plugs installed on them;
c) voltage converter (24 V), sensors, sound alarms and other assembles.

Electrical equipment of engine for tractors BELARUS-1221.2/1221B.2/1221.3» is identical. The specific feature of electrical equipment of tractor BELARUS-1221.3» is availability of glow plugs to make start-up easier at low temperatures.

**Where glow plugs are available** the following additional elements are provided:
- harness of glow plugs;
- relay of glow plugs.

**With 24V start-up system** the electrical equipment includes:
- voltage converter;
- harness of voltage converter.

Tractors BELARUS-1221.4 correspond to level Tier-3A, they are equipped with engines MMZ and Deutz. They have engine electrical equipment that is characterized by:
a) mandatory availability of glow plugs and elements related to them;
b)availability of the electronic unit for engine control;
c) absence of some sensors installed on preceeding models;
d) change in location of voltage converter;
e) connection of converter is included in the main harness of engine electrical equipment;
As a rule, dismounting assemblies of the electrical equipment system is connected with replacement of tractor engine or failure of some electrical equipment elements (sensors, harness, relays, converter, etc).

**ATTENTION:** mount and dismount elements of engine electrical equipment with terminals of storage batteries disconnected..

### 11.1.1 Dismounting elements of electrical equipment of engine (MMZ) mounted on tractors BELARUS-1221.2/1221B.2

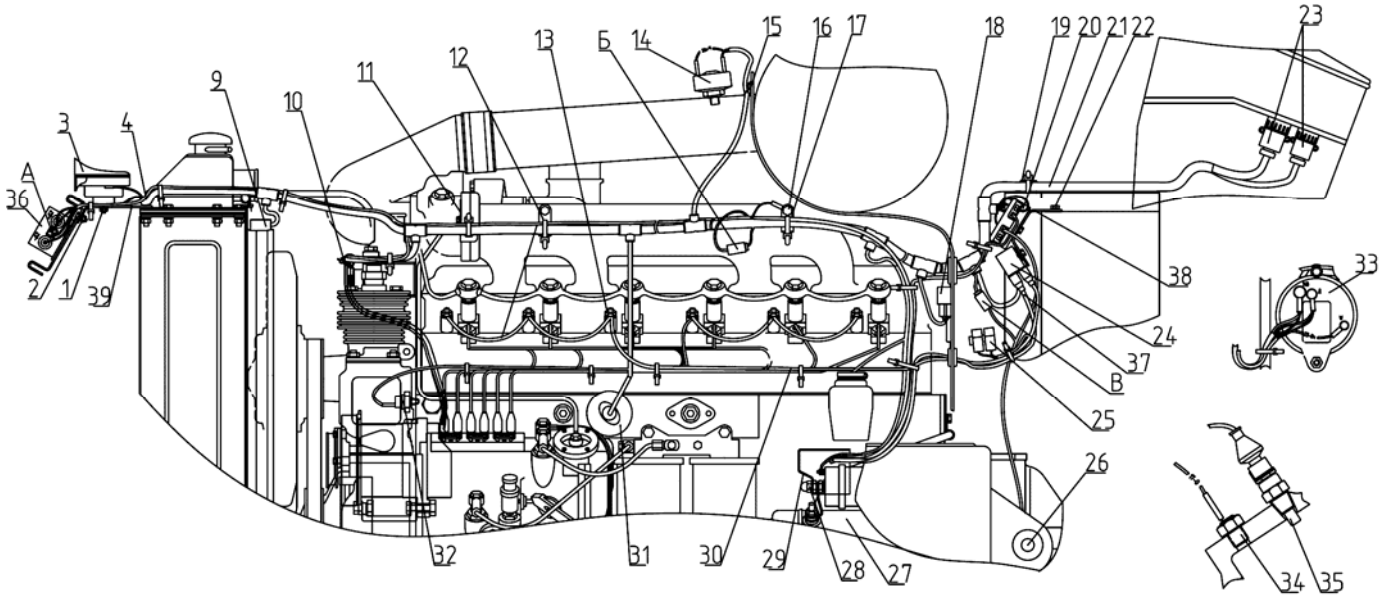



**Figure 11.1**

**a) to dismount harness of electrical equipment for engine** do the following:

1) disconnect from generator 33 (Figure 11.1) terminals “14V”, “D” and “W”;
2) disconnect wires from sensor of air purifier clogging 14, situated in front of air filter;
3) disconnect carrier socket from sensor of oil pressure 31 and socket from sensor of emergency oil pressure 32 (situated on engine unit);
4) disconnect carrier socket from temperature sensor 35 and socket from sensor of emergency oil pressure 34 (situated on thermostat body), disconnect wiring from panels 9;
6) disconnect wiring from box of fuses 20, carrier socket and bolt tip from relay of glow plugs 24;
7) unscrew figured nut 28, remove housing 29, unscrew both nuts of starter 27 (terminals “+30” and “+50”), remove all wiring;
8) unscrew bolt 16 and disconnect tip;
9) unbend clamp 15;
10) disconnect carrier socket from 18;
11) disconnect wiring from signals 3;
12) dismantle collars (including those on arms 10, 11, 12, 17, 19);
13) disconnect carrier sockets “B” and “V”;
14) unscrew two terminals 23 on front cabin walls.

**b) to dismount harness 21 (Figure 11.1) of engine electrical equipment (start-up system 24 C), perform all operations given in item “a” (see above);**

**c) to dismount harness of voltage converter 4 (Figure 11.1) (start-up system 24 C) do the following:**

1) disconnect from generator 33 terminals “14V” and “D”;
2) unscrew figure nut 28 and remove starter housing, unscrew nut M10 and disconnect wire;
3) disconnect carrier socket “A” from voltage converter 36, unscrew screws;
4) disconnect carrier socket “B”;
5) dismantle collars.

Mount units of electrical equipment system in sequence reverse to dismounting.

**11.1.2 Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.3**

**To dismount harness 21 (Figure 11.1) of engine electrical equipment (start-up system 24 C), perform all operations given in item “a” of section 11.1.1 “Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.2/1221B.2”;**

**To dismount harness of voltage converter 4 (Figure 11.1) perform operations given in item “в” of section 11.1.1 “Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.2/1221B.2”;**

**a) to dismount harness of glow plugs 30 (Figure 11.1)** do the following:

1) unscrew screw on relay of glow plugs 24;
2) unscrew six nuts of glow plugs 13;
3) suspended fuses are part of this harness 25;
4) dismantle collars.

**11.1.3 Dismounting electrical equipment elements of engines (MMZ or Deutz) mounted on tractors BELARUS-1221.4**

Difference inengines MMZ (Figure 11.2) and Deutz (Figure 11.3) lies in the arrangement of glow plugs (MMZ – on the left side, Deutz – on the right side of forward tractor travel) and routs of electrical equipment harness of engines (MMZ – along engine top, Deutz – along engine bottom).

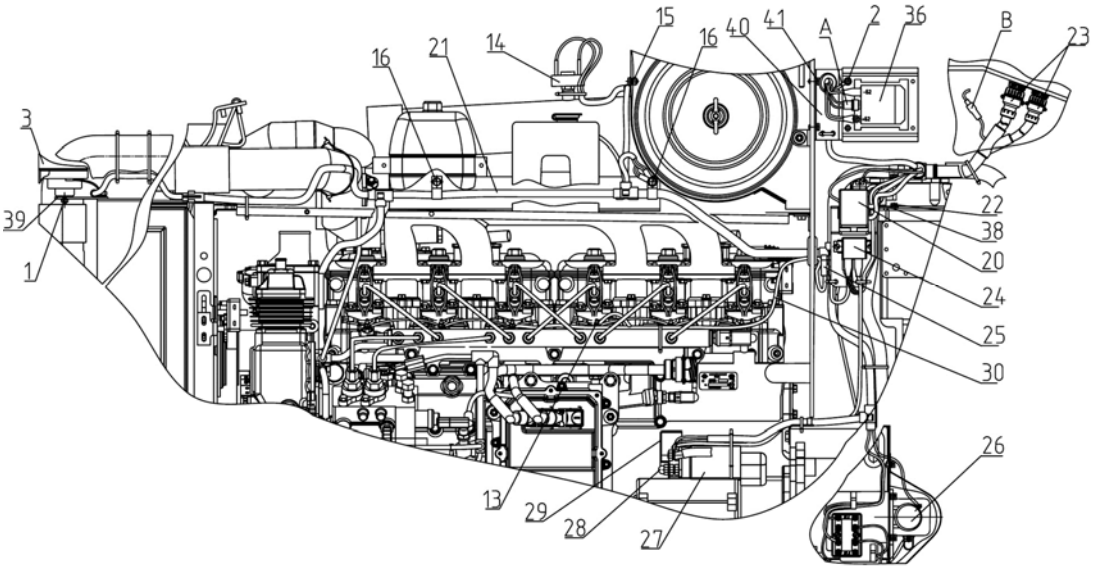



**Figure 11.2** Engine MMZ

**To dismount harness of engine electrical equipment 21 (figures 11.2, 11.3) perform operations given in item "a" of section 11.1.1 "Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.2/1221B.2";**

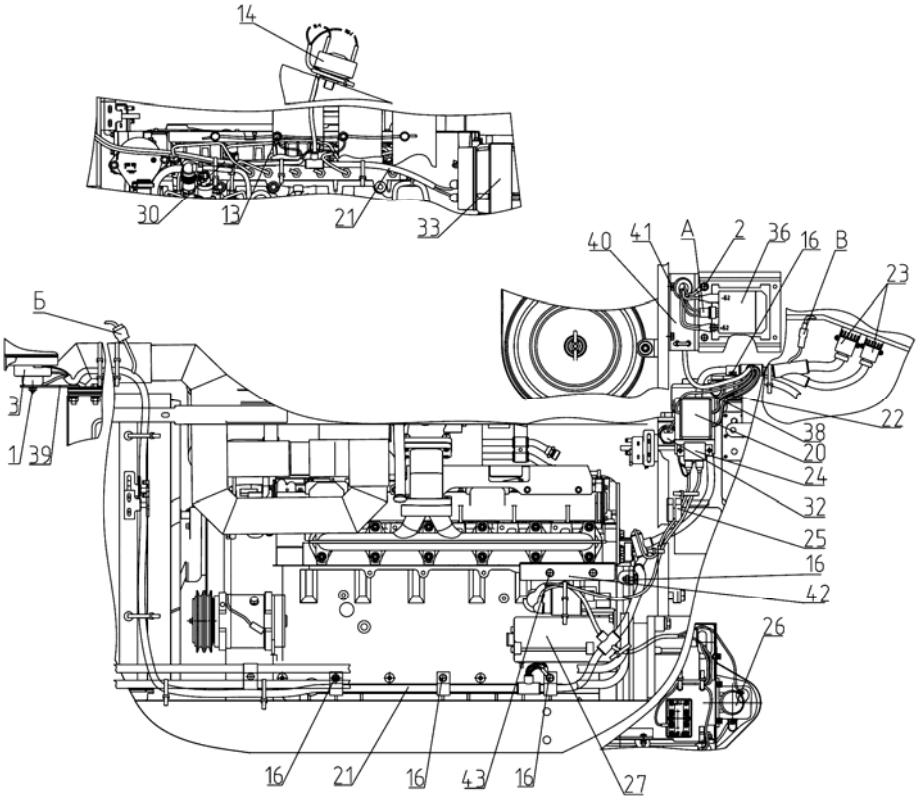



**Figure 11.3** Engine Deutz

**To dismount harness of glow plugs 30 (figures 11.2, 11.3) perform operations given in item "a" of section 11.1.2 "Dismounting electrical equipment elements of engine (MMZ) mounted on tractors BELARUS-1221.3"**

**Replacement of some elements of engine electrical equipment:**

To replace box of fuses 20 dismantle all incoming wiring and unscrew two screws M6;
To replace relay of glow plugs 24 dismantle all wiring (including wire for feeding relay 37) and unscrew two screws M6;
To remove arm of the box of fuses and relay of glow plugs 38 unscrew two bolt M8 22 on oil tank;
To dismount voltage converter 36, disconnect all wires, unscrew two bolts M6 2;
To dismount sound alarms 3, disconnect wiring and unscrew nut 1;
To dismantle arm 39, unscrew two bolts M8 of radiator;
To dismantle arm 40, unscrew two bolts 41, fastening it to tractor shell;
To dismantle screen of starter 42, unscrew two bolts 43 in engine unit.

**Assembly (erection) of units of engine electrical equipment system:**

Assembly of engine electrical equipment is made in reverse sequence, with the following torques borne in mind:
a) torque outputs of generator 33 to:
"14V" - from 9 to 13 Nm,
"D" and «W» - from 2.0 to 3.0 Nm;
b) outputs of starter 27:
"+30" - from 15 to 18 Nm,
"+50" - from 2 до 3 Nm;
c) outputs of voltage converter 36, screws of relay of glow plugs 24 and nuts of box of fuses 20 from 1,9 to 2,1 Nm;
d) nuts of outpus of switch "ground" 26:
M4 – from 1,9 to 2,1 Nm;
M6 – from4,0 to 4,5 Nmм;
e) tighten connectors 23 of harness 21, screws for fastening box of fuses 20 and relay of glow plugs 24 to the end;
f) sensor of air purifier clogging 14 from 2,0 to 2,2 Nm;
g) sensors of engine emergency oil pressure 32 from 10 to 15 Nm;
h) sensor of temperature indicator 35 from 30 to 35 Nm;
i) sensor of engine oil pressure 31 from 20 too 25 Nm;
j) sensor of emergency temperature 34 from 25 to 30 Nm;
k) bolts for fastening arms 10, 11, 12, 17, 19, 38, 39, 41 – from 18 to 25 Nm.

## 11.2 Disassembly-assembly of storage battery compartment and starting system elements mounted on tractors BELARUS-1221.2

Disassembly-assembly of storage battery compartment and elements of engine starting system is, as a rule, connected with failure of some elements. It includes:

a) replacement of “ground” switch;

b) replacement of storage batteries;

### Dismounting elements of storage battery compartment

Before dismounting elements of storage battery compartment unscrew four bolts fastening compartment cover.

**To replace “ground” switch 7** (Figure 11.4), do the following:

a) disconnect wires (1), (2), having first unscrewed nuts on the “ground” switch proper 7;

b) dismount “ground” swich, having unscrewed two nuts (4), that fasten it to storage battery compartment;

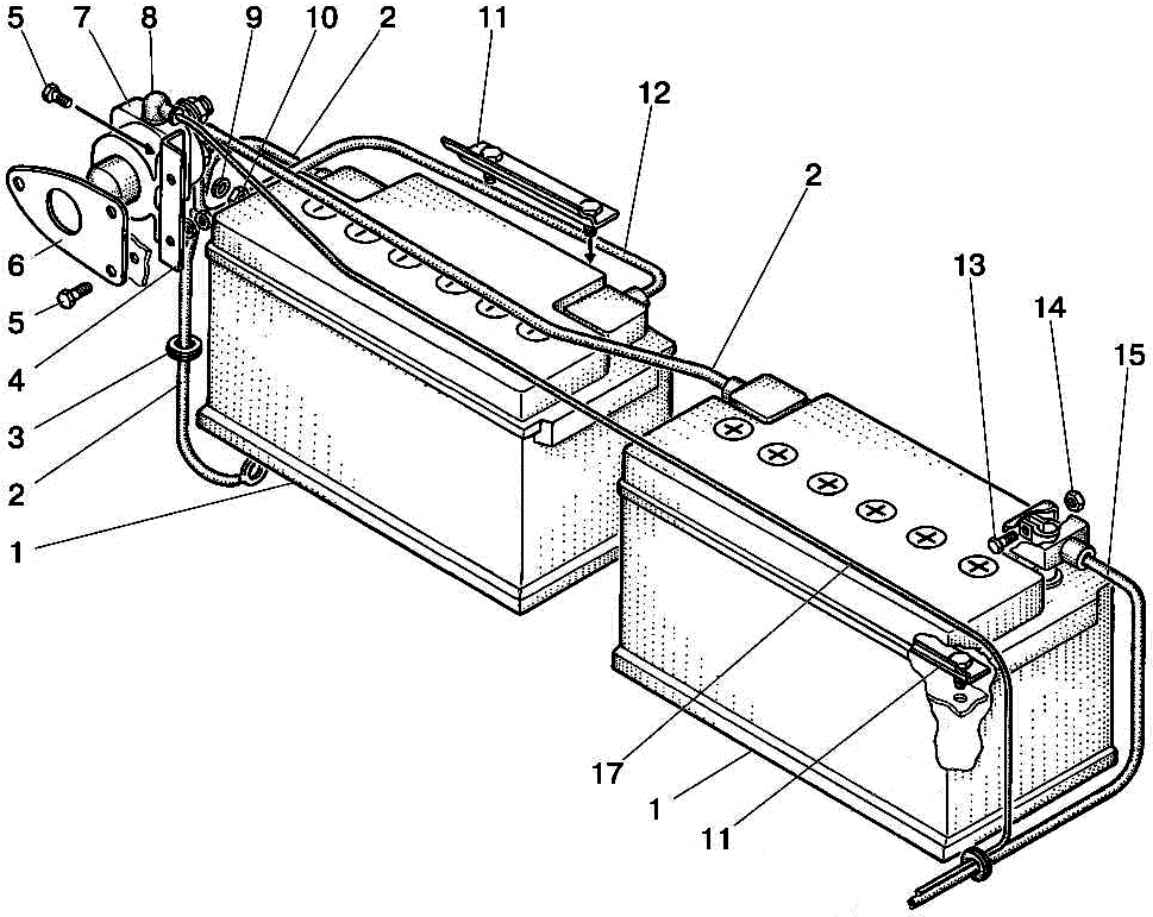



**Figure 11.4**

**To replace two storage batteries 1** (Figure 11.4), do the following:

a) remove terminals from storage batteries, loosening bolts 13;
b) unscrew nuts of clamps 11, that fix storage batteries;
c) pull out the batteries.

Make mounting and erection in reverse sequence, with torques borne in mind:
a) torque terminals of «ground» switch to:
“M5” – 1…1.5 Nm;
“M6” – 5…5.5 Nm;
“M8” – 14…15 Nm;

b) torque nuts of SB terminals to 6.0…6.5 Nm;
c) grease terminals of storage batteries and wiring tips with grease LITOL-24

**ATTENTION:** Observe polarity to connect storage batteries and wires to switch of “ground”

## 11.3 Disassembly-assembly of storage battery compartment and starting system elements mounted on tractors BELARUS-1221B.2/1221.3/1221.4 with engines MMZ and Deutz»

Disassembly-assembly of storage battery compartment and elements of engine starting system is, as a rule, connected with failure of some elements. It includes:

a) replacement of “ground” switch;
b) replacement of storage batteries;
c) dismounting storage battery box.

### 11.3.1 Dismounting elements of storage battery compartment

**To replace “ground” switch 3** (Figure 11.5), do the following:

a) disconnect wires (1), (2), having first unscrewed nuts on the “ground” switch proper 4;
b) dismount housing of ground switch by unscrewing two bolt 8, that fasten it to storage battery box;
c) dismount “ground” swich, having unscrewed two nuts (4), that fasten it to storage battery box

**To replace two storage batteries 1** (Figure 11.5), do the following:

a) remove terminals from storage batteries, loosening bolts 10;
b) unscrew nuts of clamps 11, that fix storage batteries 12;
c) unscrew bolts 13,and remove clamps 14, that fix storage batteries;
d) pull out storage batteries.

**To dismount storage battery box 5** (Figure 11.5), do the following:

a) dismount storage batteries 11, as explained above;
b) unscrew bolts 15 fastening storage battery box 5 and dismount it.

Make mounting and installation in reverse order, with torques borne in mind:

a) torque terminals of ground switch to:
“M5” – 1…1.5 Nm;
“M6” – 5…5.5 Nm;
“M8” – 14…15 Nm;
“M16” – 130…200 Nm.

b) torque nuts of SB terminals to 6.0…6.5 Nm;
c) grease terminals of storage batteries and wiring tips with grease LITOL-24

**ATTENTION:** Observe polarity to connect storage batteries and wires to switch of “ground”

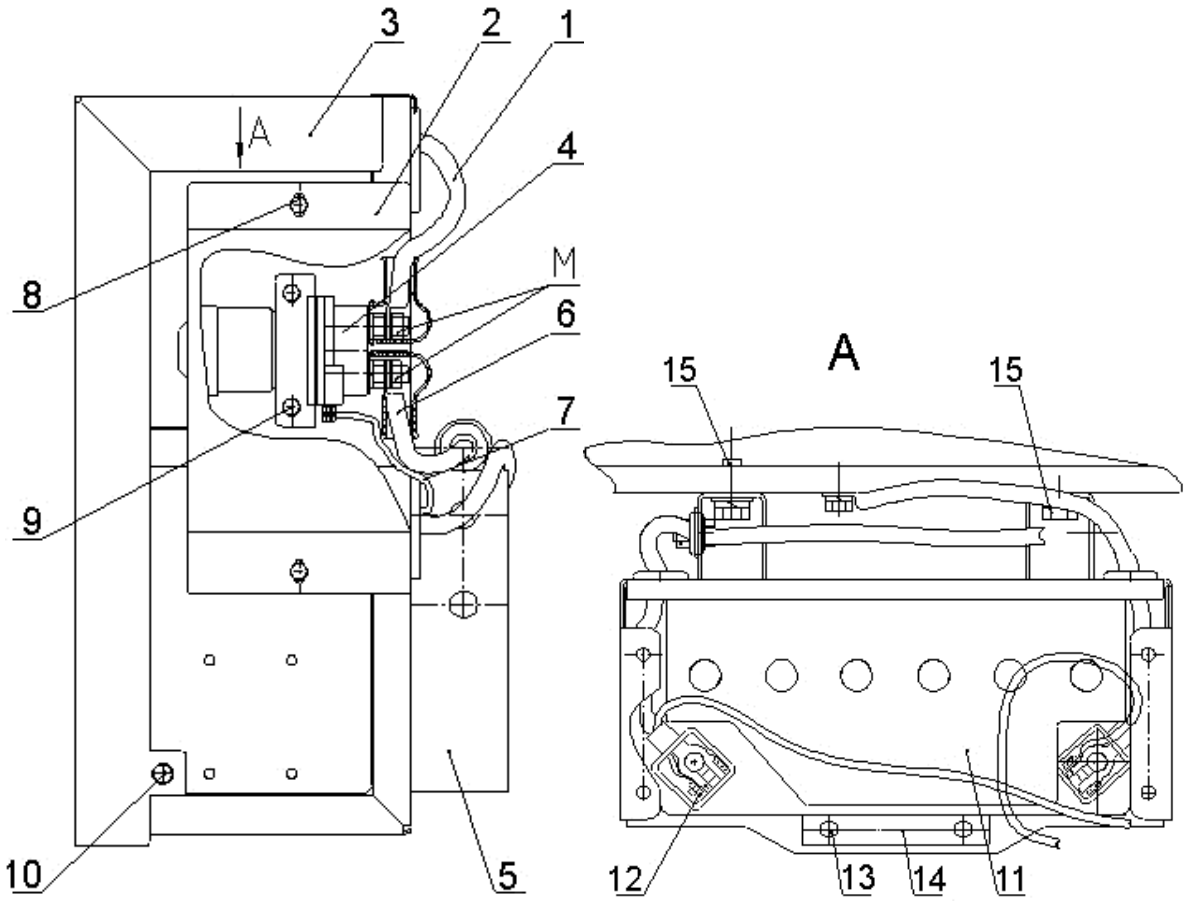



**Figure 11.5** Disassembly-assembly of storage battery compartment and elements of start-up system.

**11.4 Dismounting-mounting of elements of transmission electrical equipment**

**Dismounting of transmission harness on tractor BELARUS-1221 and its modifications:**

a) disconnect connector “L” of harness 1 (Figure 11.6) from connector of dashboard, situated on front cabin wall;

b) dismantle harness 1 (Figure 11.6), and disconnect its carrier sockets from:

1) switch of start interlock a 6;

2) sensor of pneumatic system air pressure 2;

3) sensor of emergency air pressure in pneumatic system 4;

4) sensor of oil pressure in GB 5;

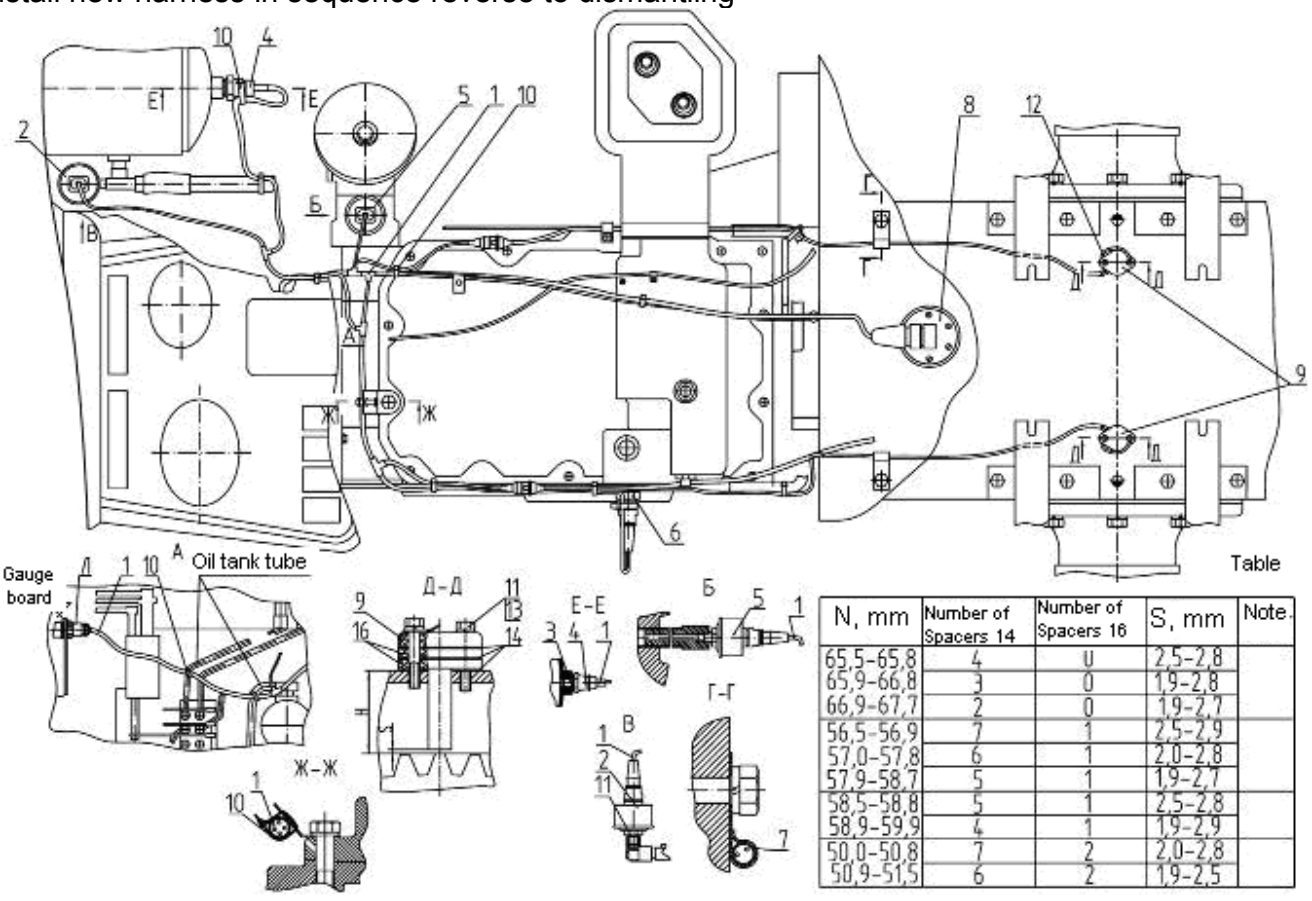
5) two speed sensors 9;

6) sensor of fuel volume 2 (Figure 11.8) for tractors BELARUS-1221.4;

6.1) sensor of fuel level 8 (Figure 11.6) mounted on tractors BELARUS-1221.2/1221.3;

c) disconnect fastening gaskets 10 along entire harness length and remove harness 1 from transmission.

Install new harness in sequence reverse to dismantling




| N, mm | Number of Spacers 14 | Number of Spacers 16 | S, mm | Note |
|---|---|---|---|---|
| 65,5-65,8 | 4 | 0 | 2,5-2,8 | |
| 65,9-66,8 | 3 | 0 | 1,9-2,8 | |
| 66,9-67,7 | 2 | 0 | 1,9-2,7 | |
| 56,5-56,9 | 7 | 1 | 2,5-2,9 | |
| 57,0-57,8 | 6 | 1 | 2,0-2,8 | |
| 57,9-58,7 | 5 | 1 | 1,9-2,7 | |
| 58,5-58,8 | 5 | 1 | 2,5-2,8 | |
| 58,9-59,9 | 4 | 1 | 1,9-2,9 | |
| 50,0-50,8 | 7 | 2 | 2,0-2,8 | |
| 50,9-51,5 | 6 | 2 | 1,9-2,5 | |

**Figure 11.6** Transmission electrical equipment of tractors BELARUS-1221.2/1221B.2/1221.3

**Dismounting of air pressure sensor 2** (Figure 11.6)**:**

a) disconnect coupling carrier socket of harness 1 (Figure 11.6 view “B”);
b) unscrew sensor 2;
c) remove sealing ring 11;
When installing new sensor torque it to from 20 to 25 N m, having put new sealing ring 11 to provide air tightness.

**Dismounting of sensor of emergency air pressure 4** (Figure 11.6)**:**

a) disconnect coupling carrier socket of harness 1 (Figure 11.6 “E-E”);
b) unscrew sensor 4 together with washer 3.
When installing new sensor, torque it from 20 to 25 N m, having put new washer 3 to provide air tightness.
Where pneumatic system is not installed on tractor, tie outlets of air pressure sensor 2 (Figure 11.6) and sensor of emergency air pressure in knot, place in PVC pipe 8 (Figure 11.7) and fasten with collars 10, having first put a jump in two-terminal carrier socket 19.

**Dismounting of oil pressure sensor 5** (Figure 11.6) **in GB:**

a) disconnect coupling carrier socket of harness 1 (Figure 11.6 view “B”);
b) unscrew sensor 5.
When installing new sensor, torque it from 20 to 25 N m

**Dismounting of speed sensors: 9** (Figure 11.6)**:**

a) disconnect coupling carrier socket of sensors 9 from carrier sockets of harness 1;
b) disconnect fastening collars 10 and unbend collars (cross-section “Г-Г”) for fastening sensors’ wires;
c) disconnect fastening bolts 11 (Figure 11.6 “Д-Д”) with washers 13;
d) dismount sensors 9, having removed adjustment shims 14, 16;
e) mount new sensors having provided necessary clearance “S” or “S1”, and to do this:
1) using caliper gauge dimension «H» on the surface on which sensor is installed to end face of gear tooth;
2) ) using corresponding table select required number of adjustment shims 14 and 16;
3) put fastening bolts 6 or 12 with washers 13 on sealant, having first put wire of sensors’ “ground” under any of bolts 6 or 12, and torque bolts to from 10 to 15 N m.

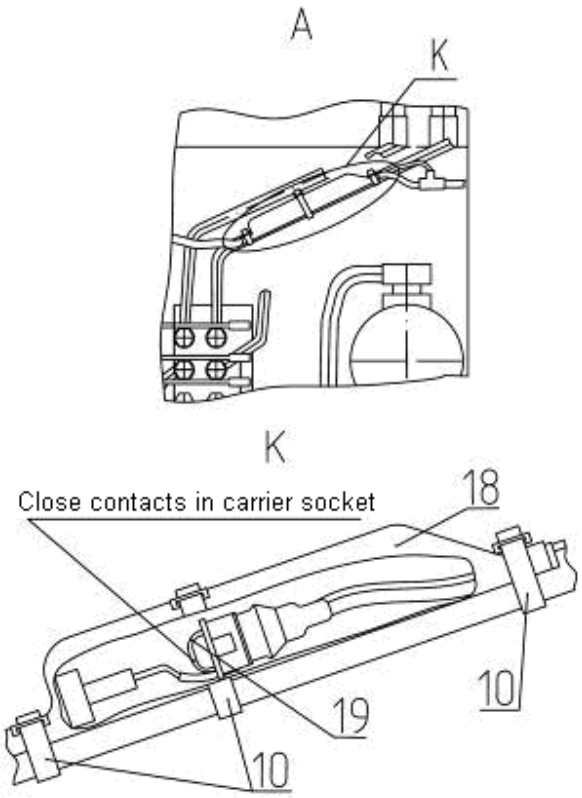



**Figure 11.7** When tractor is not equipped with pneumatic system.

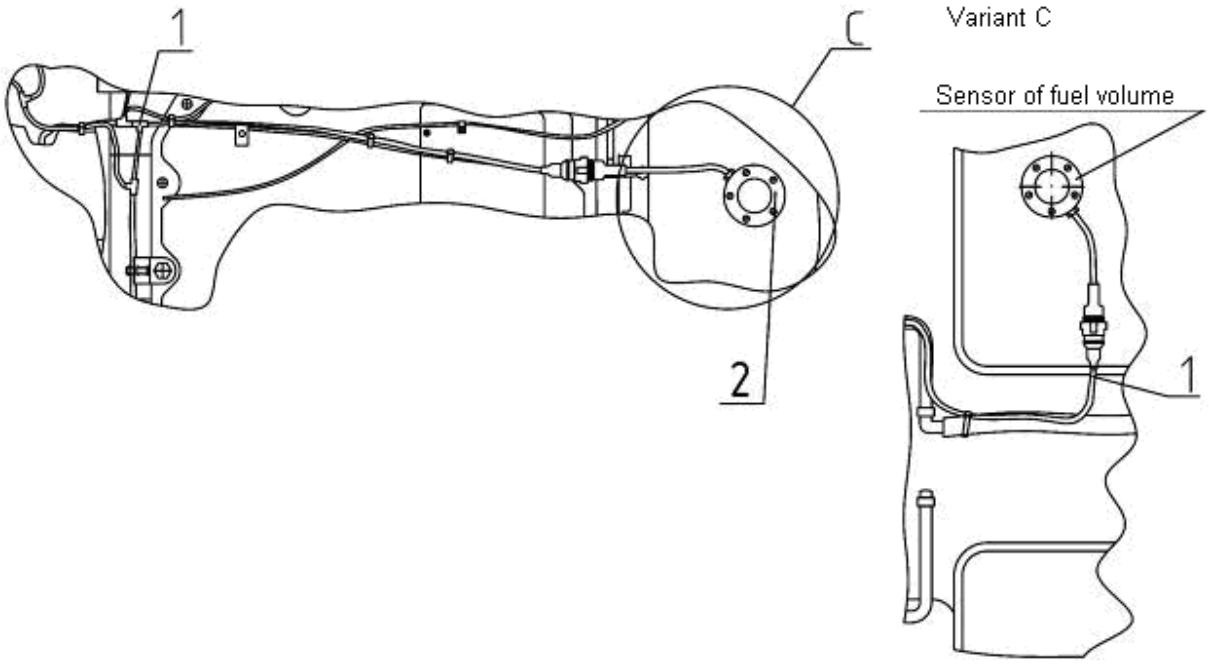


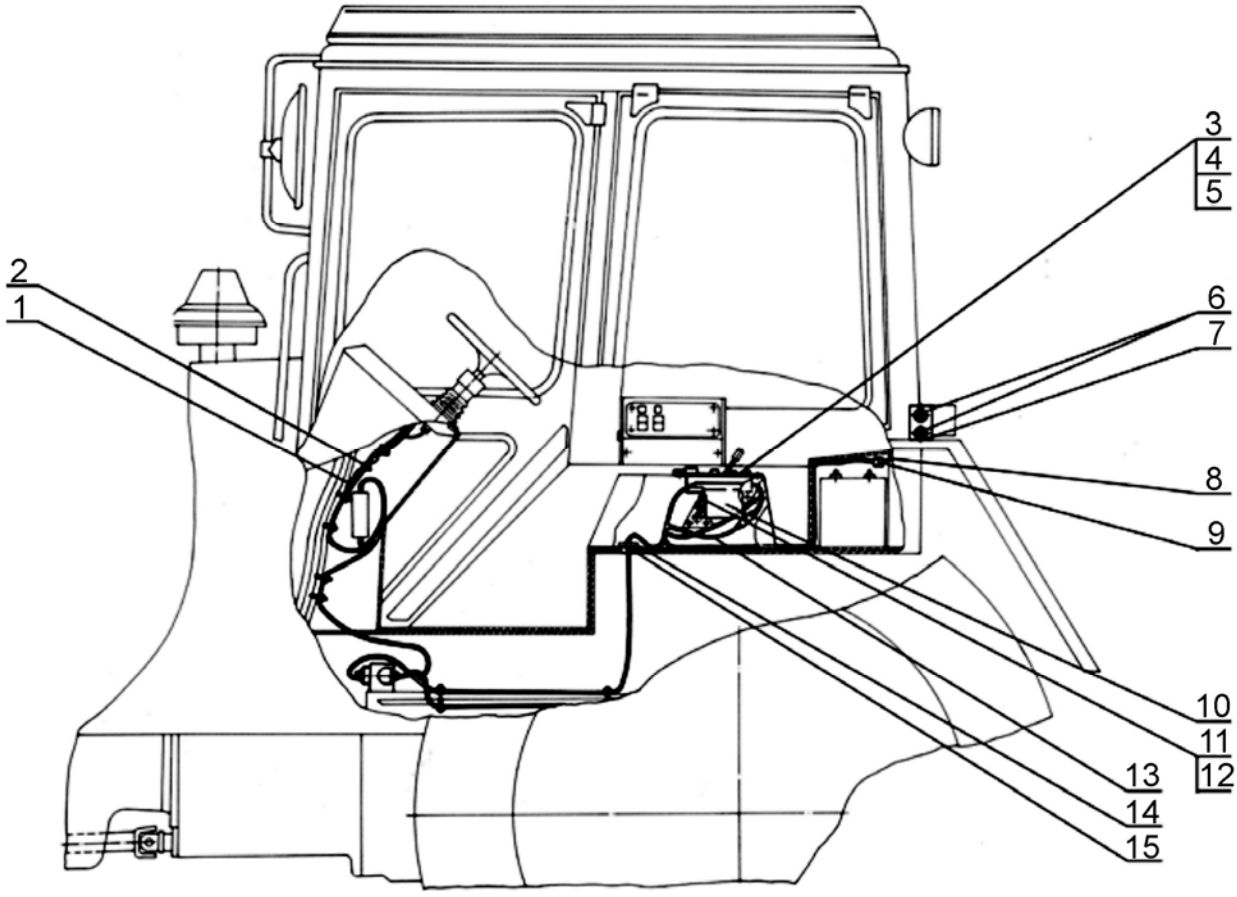

**Figure 11.8** Specific feature of electrical equipment of tractors BELARUS-1221.4

## 11.5 Control of tractor units

### 11.5.1 Control of rear hinge device (RHD) 1221 – 8700610 mounted on tractors BELARUS-1221.2/1221B.2

**To replace control panel 3 or electronic unit 10** (Figure 11.9) remove cover of right side panel, see section **8.4** “Disassembly-assembly of facia panels of right side board”

**To replace control panel 3** do the following:
a) disconnect connector of panel harness 3 from connector of cabin harness 13;
b) unscrew four screws 4 with nuts 5 for fastening control panel 3 to cover of right side panel;
c) extract panel 2 with outcoming harness from seat in cover of right side panel 5;
Install new panel in reverse sequence.




1 – transmission harness; 2 – collar; 3 – control panel; 4 – screw; 5 – nut 6 – button switch with check nut; 7 – arm; 8 – harness; 9 – carrier socket; 10 – electronic unit; 11 – bolt; 12 – nut; 13 – cabin harness; 14 – plate; 15 – bushing.

**Figure 11.9** Control of RHD (electrical part) BELARUS-1221.3

**To replace electronic unit 10** perform the following actions:

a) unscrew bolts 11 with nuts 12 for fastening unit 10 to right side panel;
b) disconnect twenty five-contact connector of harness 13 from unit 10;
c) dismount electronic unit 10;
Mount and connect new electronic unit 10 in reverse sequence.

**To replace button switches 6** perform the following actions:

a) disconnect from relevant switch 6 harness 8 (by pressing clamp of connector fixing);
b) unscrew check nut that fastens switch 6;
c) extract switch 6 from seat in arm 7.

Observe the fllowing sequence of mounting new switch 6:
a) put switch 6 in seat in arm 7;
b) place switch with clamp outwards;
c) tighten check nut (torque (5±0,5)H l);
d) connect terminal of harness 8 to switch 6 (for switches 6 “rise” (of upper) – branch of harness 8 with mark).

**NOTE:** change elements of hinge device control and connect them according to electrical wiring diagram enclosed.

### 11.5.2 Operations to be performed when dismounting/mounting cabin:

Disconnect electrical connector of cabin harness 13 from transmission harness 1 (fastened on KO cover).
Replace harness of HD control system according to diagram (Figure 11.10).

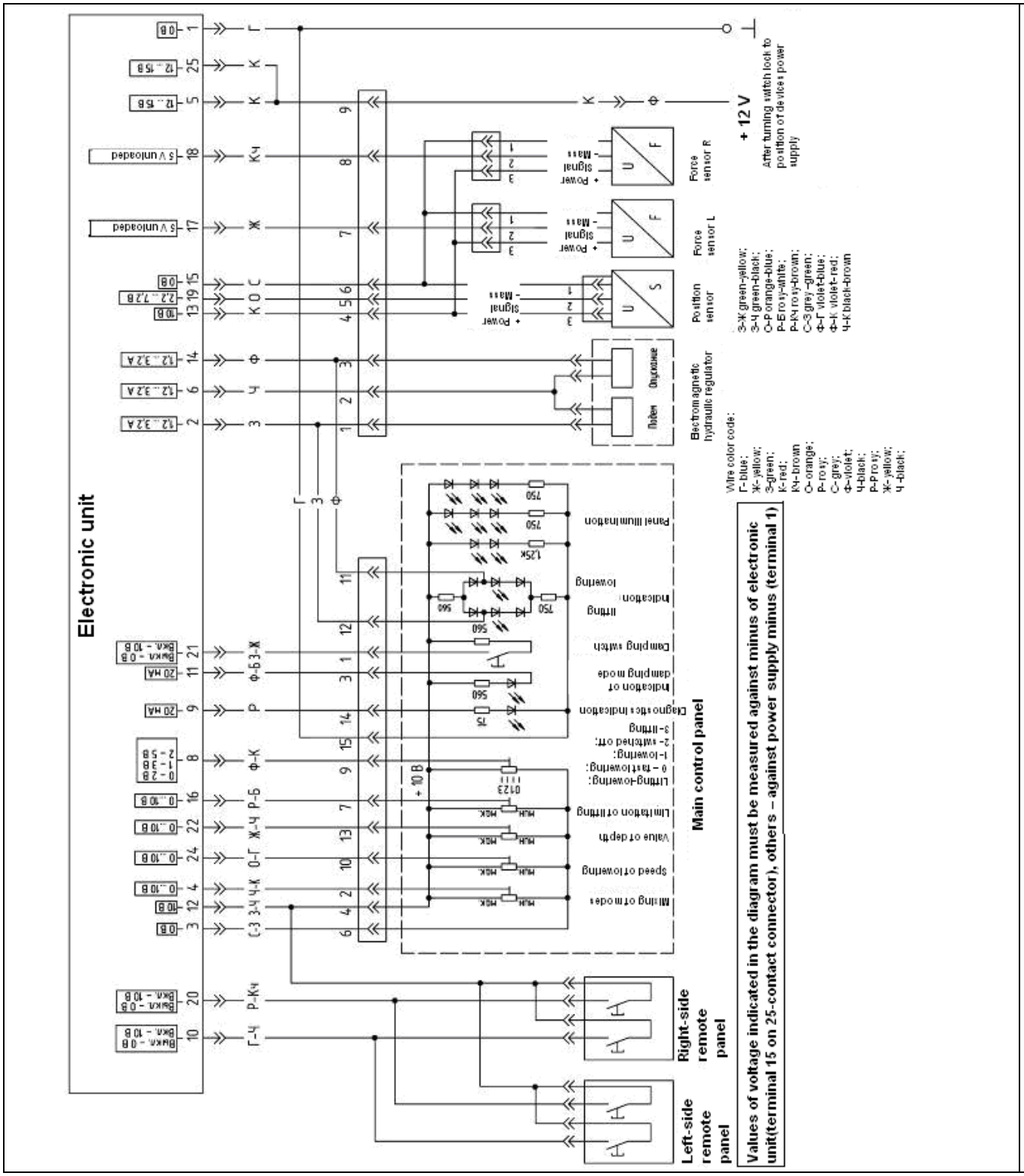



**Figure 11.10** \electric diagramm of control system of RHD

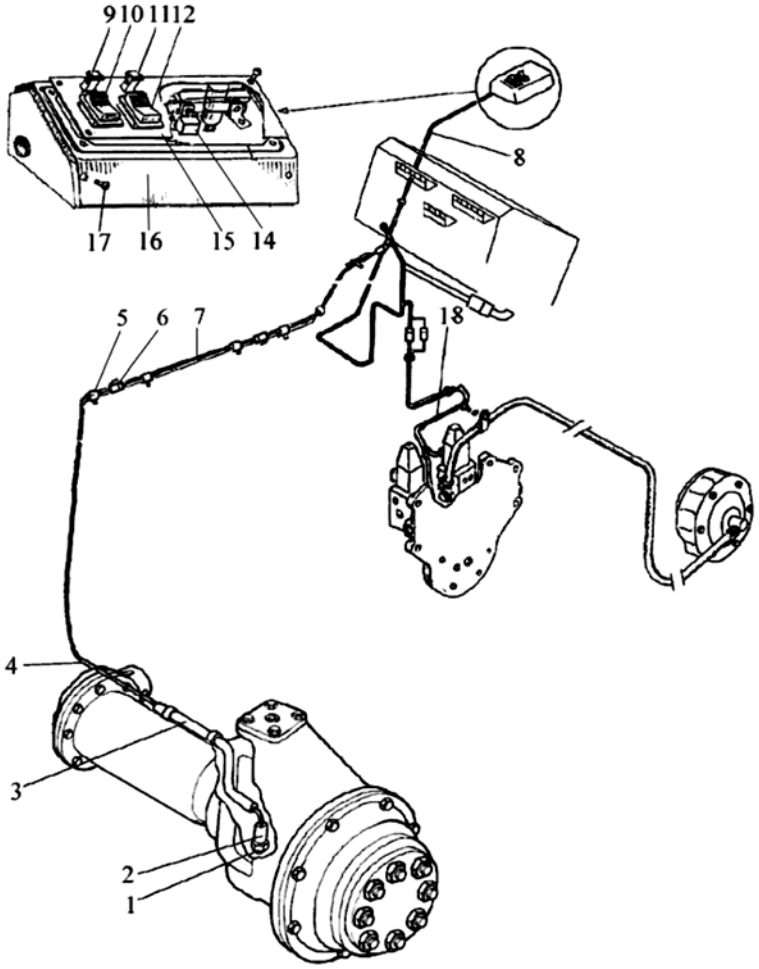
11.5.3 Control of DI and FDA 1221-8700410 (electrical part) mounted on tractors BELARUS-1221.3

To replace switch ВК 12-51 (sensor of turn angle of drive wheels), mounted on FDA left side (during forward movement of tractor) do the following:

a) turn drive wheels to the end left (right) side to the end;

b) ) with diesel shut down disconnect harness cornector 4 (Figure 11.11) from switch 2;

c) using wrench unscrew switch 2 from seat in FDA beam, remove adjustment shims 1.




1 – adjustment spacer; 2 – switch ВК 12-51; 3 – pipe; 4 – harness fir FDA and switch ВК 12-51; 5 – gasket; 6 – pin carrier socket; 7 – harness for engine; 8 – harness for cabin; 9, 11 – control lamp; 10 – FDA switch; 12 – DI switch; 14 – relay; 15 – panel; 16 – cover; 17 – screw; 18 – transmission harness

**Figure 11.11** – Control of DI and FDA (electrical part) BELARUS-1221.3

Installation of new switch ВК 12-51 is made in reverse order.

Torque of switch 2 - (45±5) Nm.

Number of adjustment spacers (1) is provided by adjustment of switch actuation (2). Actuation of switch (2) (contacts opening) must take place when drive wheels turn to angle over (13±2)° to any side (decrease of the number of adjustment spacers leads to reduction of switch actuation angle). With position of drive wheels corresponding to straight movement, contacts of switch (2) must be closed (extension on lower axle of left-side FDA reduction gear presses switch ball). Lower axle of the left-side reduction gear differs from other ones by availability of lug. This axle must be mounted so that the lug was located along FDA axle (across the tractor). The availability of lug can be checked by means of screwdriver through threaded opening where switch (2) in FDA beam is installed.

**ATTENTION:** When lubricating bearing of lower left-side axle remember that bearing cavity is closed tightly, and building up of excessive pressure inside cavity when injecting grease leads to damage of switch ВК12-51.

**To replace harness (4) across FDA to switch ВК 12-51 (**sensor of turn angle if drive wheels**)** do the following**:**

a) ) disconnect terminals of harness (4) and (7

b) remove pin carrier socket (6) from harness (4);

c) disconnect gaskets (5) for fastening harness (4

d) pass the harness through pipe (3).

Install new harness in reverse sequence

**To replace elements on panel (15) for control of DI and FDA (**switches, control lamps, relay and so on) do the following:

a) unscrew four screws (17) for fastening cover (16) and raise cover as an assembly with panel (15)

b) disconnect terminals of harness (8) from corresponding element, remove the element from panel (15).

Installation of corresponding element is made in reverse sequence

**11.5.4 Operations to be performed when replacing engine:**

a) on both sides disconnect connectors of engine harness (7) (from FDA harness (4) and from cabin harness (8));

b) dismount engine harness 7.

After replacement of engine install and connect harness (7) in reverse sequemce.

**11.5.5 Operations to be made when dismounting-mounting the cabin:**

a) before dismounting the cabin disconnect connectors of cabin harness (8) from engine harness (7) and transmission harness (18);

b) After mounting the cabon connect terminals of cabin harness (8) to engine harness (7) and transmission harness (18).

Replace harness of DI and FDA control system according to diagram (Figure 12.4).

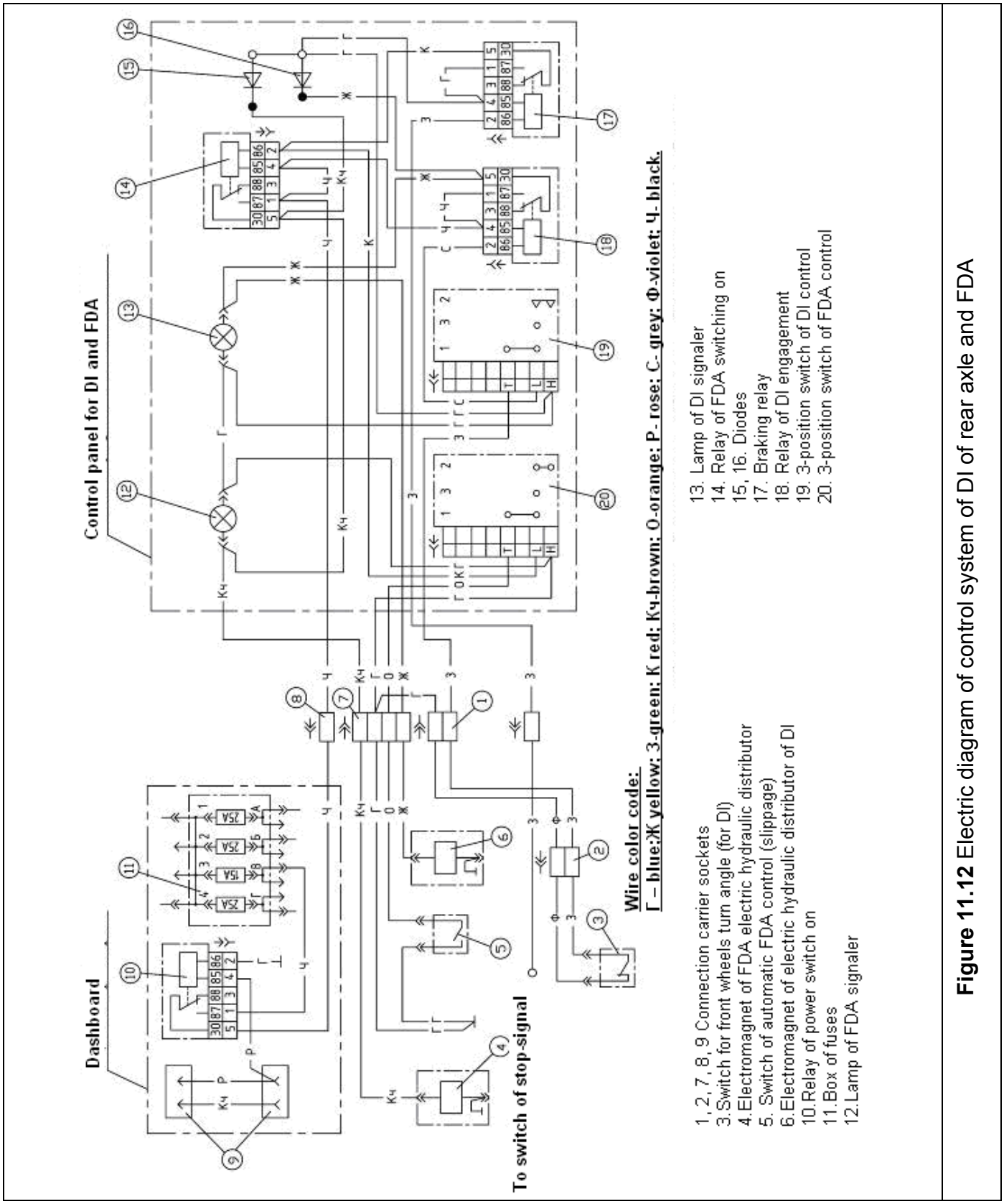



**Figure 11.12** Electric diagram of control system of DI of rear axle and FDA

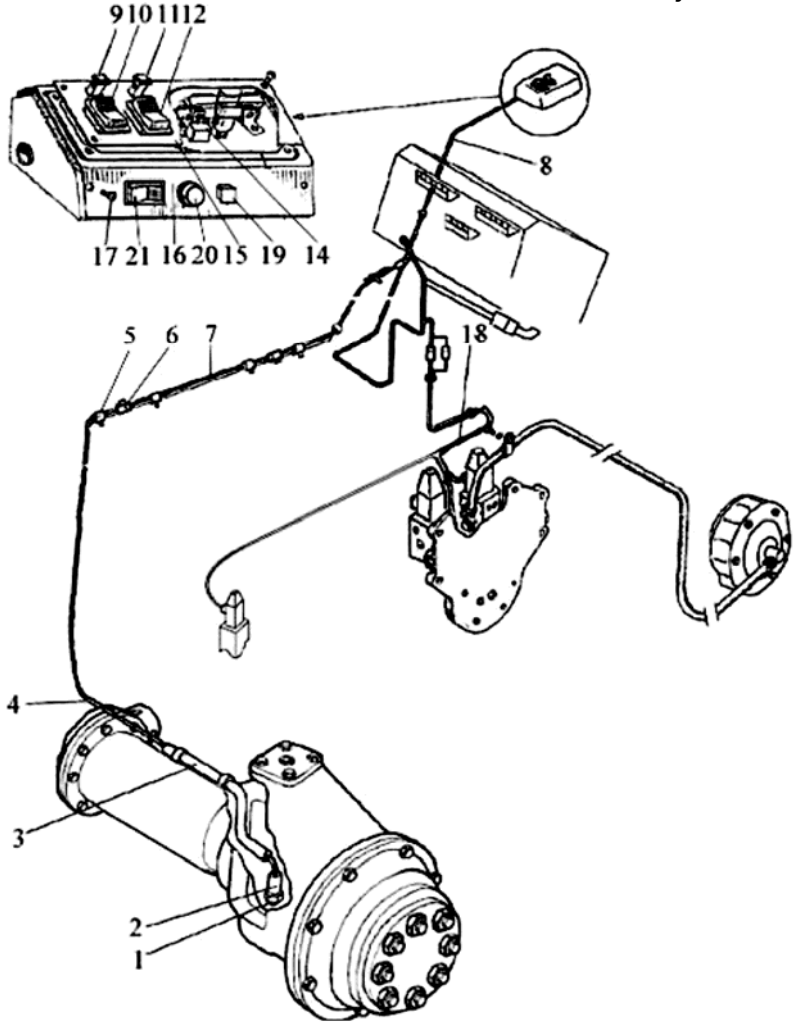
**11.6 Control of DI, FDA and front PTO 1221-8700210-Д (electrical part) mounted on tractors BELARUS-1221.3**

**To replace switch ВК 12-51** (sensor of turn angle of drive wheels), mounted on FDA left side (during forward movement of tractor) do the following:

a) turn drive wheels to the end left (right) side to the end;

b with diesel shut down disconnect harness cornector 4 (Figure 11.11) from switch 2;

c) using wrench unscrew switch 2 from seat in FDA beam, remove adjustment shims 1.




1 – adjustment spacer; 2 – switch ВК 12-51; 3 – pipe; 4 – harness fir FDA and switch ВК 12-51; 5 – gasket; 6 – pin carrier socket; 7 – harness for engine; 8 – harness for cabin; 9, 11 – control lamp; 10 – FDA switch; 12 – DI switch; 14 – relay; 15 – panel; 16 – cover; 17 – screw; 18 – transmission harness; 20 – switch; 21 – FPTO switch.

**Figure 11.13** – Control of DI, FDA and FPTO (electrical part) mounted on tractors BELARUS 1221.3

Installation of new switch ВК 12-51 is made in reverse order.

Torque of switch 2 - (45±5) Nm.

Number of adjustment spacers (1) is provided by adjustment of switch actuation (2). Actuation of switch (2) (contacts opening) must take place when drive wheels turn to angle over (13±2)° to any side (decrease of the number of adjustment spacers leads to reduction of switch actuation angle). With position of drive wheels corresponding to straight movement, contacts of switch (2) must be closed (extension on lower axle of left-side FDA reduction gear presses switch ball). Lower axle of the left-side reduction gear differs from other ones by availability of lug. This axle must be mounted so that the lug was located along FDA axle (across the tractor). The availability of lug can be checked by means of screwdriver through threaded opening where switch (2) in FDA beam is installed.

**ATTENTION:** When lubricating bearing of lower left-side axle remember that bearing cavity is closed tightly, and building up of excessive pressure inside cavity when injecting grease leads to damage of switch ВК12-51.

**To replace harness (4) across FDA to switch ВК 12-51 (**sensor of turn angle of drive wheels**)** do the following**:**

a) ) disconnect terminals of harness (4) and (7

b) remove pin carrier socket (6) from harness (4);

c) disconnect gaskets (5) for fastening harness (4

d) pass the harness through pipe (3).

Install new harness in reverse sequence

**To replace elements on panel (15) or cover for control of DI, FPTO and FDA (**switches 10, 12 and 21, control lamps 9, 11, 19, relay 14 and so on) do the following:

a) unscrew four screws (17) for fastening cover (16) and raise cover as an assembly with panel (15)

b) disconnect terminals of harness (8) from corresponding element, remove the element from panel (15).

Installation of corresponding element is made in reverse sequence

**11.6.1 Operations to be performed when replacing engine:**

a) on both sides disconnect connectors of engine harness (7) (from FDA harness (4) and from cabin harness (8));

b) dismount engine harness 7.

After replacement of engine install and connect harness (7) in reverse sequemce.

**11.6.2 Operations to be made when dismounting-mounting the cabin:**

a) before dismounting the cabin disconnect connectors of cabin harness (8) from engine harness (7) and transmission harness (18);

b) After mounting the cabon connect terminals of cabin harness (8) to engine harness (7) and transmission harness (18).

Replace harness of DI FPTO and FDA control system according to diagram (Figure 11.4).

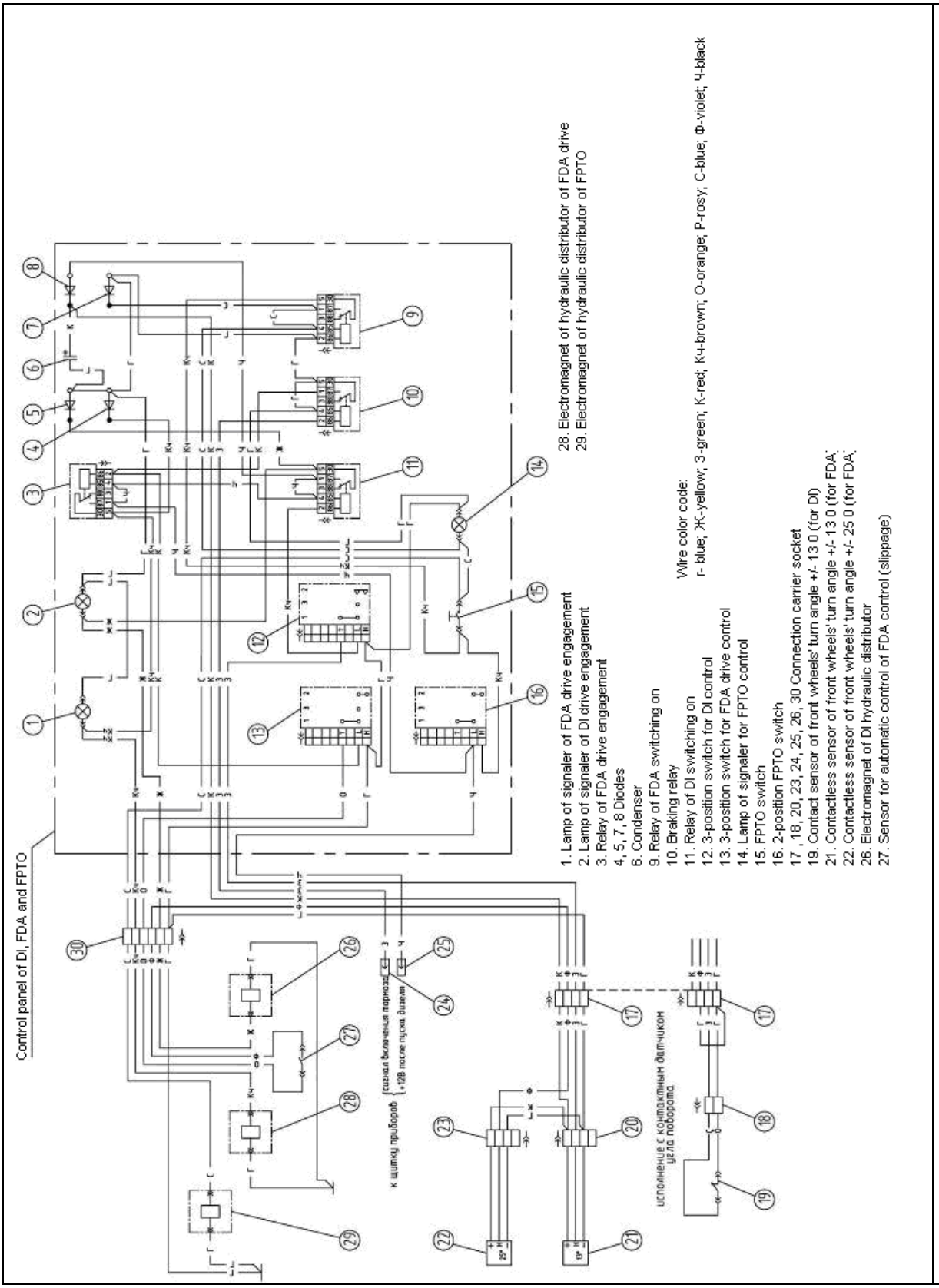



**Figure 11.4 Electric connection diagram of control system for DI, FDA and FPTO (BELARUS-1221/1221B)**

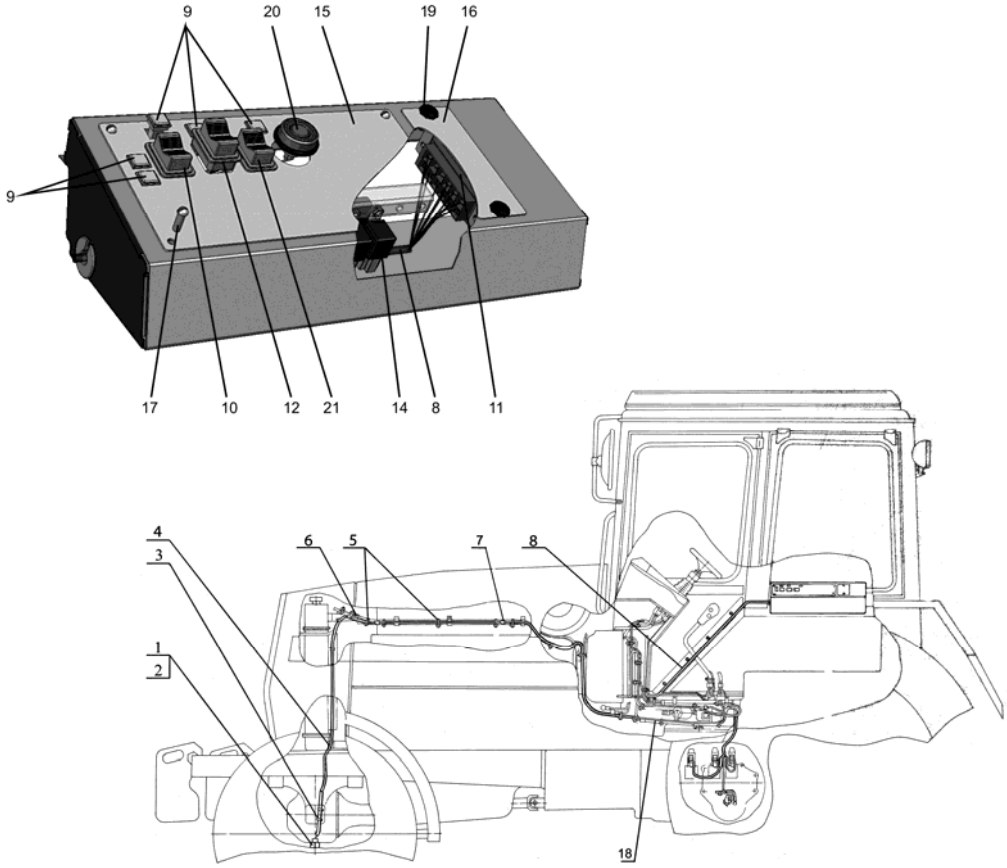
**11.7 Control of DI, FDA, PTO and reduction gear 1221-8700250-Д (electrical part) mounted on tractors BELARUS 1221.3**

**To replace switch ВК 12-51** (sensor of turn angle of drive wheels), mounted on FDA left side (during forward movement of tractor) do the following:

a) turn drive wheels to the end left (right) side to the end;

b with diesel shut down disconnect harness cornector 4 (Figure 11.11) from switch 2;

c) using wrench unscrew switch 2 from seat in FDA beam, remove adjustment shims 1.




1 – adjustment spacer; 2 – switch ВК 12-51; 3 – pipe; 4 – harness fir FDA and switch ВК 12-51; 5 – gasket; 6 – pin carrier socket; 7 – harness for engine; 8 – harness for cabin; 9, 11 – control lamp; 10 – FDA switch; 12 – DI switch; 14 – relay; 15 – panel; 16 – cover; 17 – screw; 18 – transmission harness 19 – screw; 20 – switch; 21 –switch of PTO.

**Figure 11.15** Control of DI, FDA, PTO and reduction gear (electrical part) mounted on tractors BELARUS 1221.3

Installation of new switch BK 12-51 is made in reverse order.

Torque of switch 2 - (45±5) Nm.

Number of adjustment spacers (1) is provided by adjustment of switch actuation (2). Actuation of switch (2) (contacts opening) must take place when drive wheels turn to angle over (13±2)° to any side (decrease of the number of adjustment spacers leads to reduction of switch actuation angle). With position of drive wheels corresponding to straight movement, contacts of switch (2) must be closed (extension on lower axle of left-side FDA reduction gear presses switch ball). Lower axle of the left-side reduction gear differs from other ones by availability of lug. This axle must be mounted so that the lug was located along FDA axle (across the tractor). The availability of lug can be checked by means of screwdriver through threaded opening where switch (2) in FDA beam is installed.

**ATTENTION:** When lubricating bearing of lower left-side axle remember that bearing cavity is closed tightly, and building up of excessive pressure inside cavity when injecting grease leads to damage of switch BK12-51.

**To replace harness (4)** across FDA to switch BK 12-51 (sensor of turn angle if drive wheels**)** do the following**:**

a) disconnect terminals of harness (4) and (7), b) remove pin carrier socket (6) from harness (4);

b) disconnect gaskets (5) for fastening harness (4), pass the harness through pipe (3).

Install new harness in reverse sequence

**To replace elements on panel (15) or cover for control of DI, FPTO and FDA (**switches 10, 12 and 21, control lamps 9, 11, 19, relay 14 and so on) do the following:

a) unscrew four screws (17) for fastening cover (16) and raise cover as an assembly with panel (15)

b) disconnect terminals of harness (8) from corresponding element, remove the element from panel (15).

Installation of corresponding element is made in reverse sequence

**To replace fuses** do the following:

a) unscrew two screws 19 for fastening civer 16 and raise it as an assembly with box of fuses;

b) remove cover from the box of fuses and extract faulty fuse from seat.

Install and assembly new fuse in reverse sequence.

**11.7.1 Operations to be performed when replacing engine:**

a) on both sides disconnect connectors of engine harness (7) (from FDA harness (4) and from cabin harness (8));

b) dismount engine harness 7.

After replacement of engine install and connect harness (7) in reverse sequemce.

**11.7.2 Operations to be made when dismounting-mounting the cabin:**

a) before dismounting the cabin disconnect connectors of cabin harness (8) from engine harness (7) and transmission harness (18);

b) After mounting the cabin connect terminals of cabin harness (8) to engine harness (7) and transmission harness (18).

Replace harness of DI FPTO and FDA control system according to diagram (Figure 11.16).

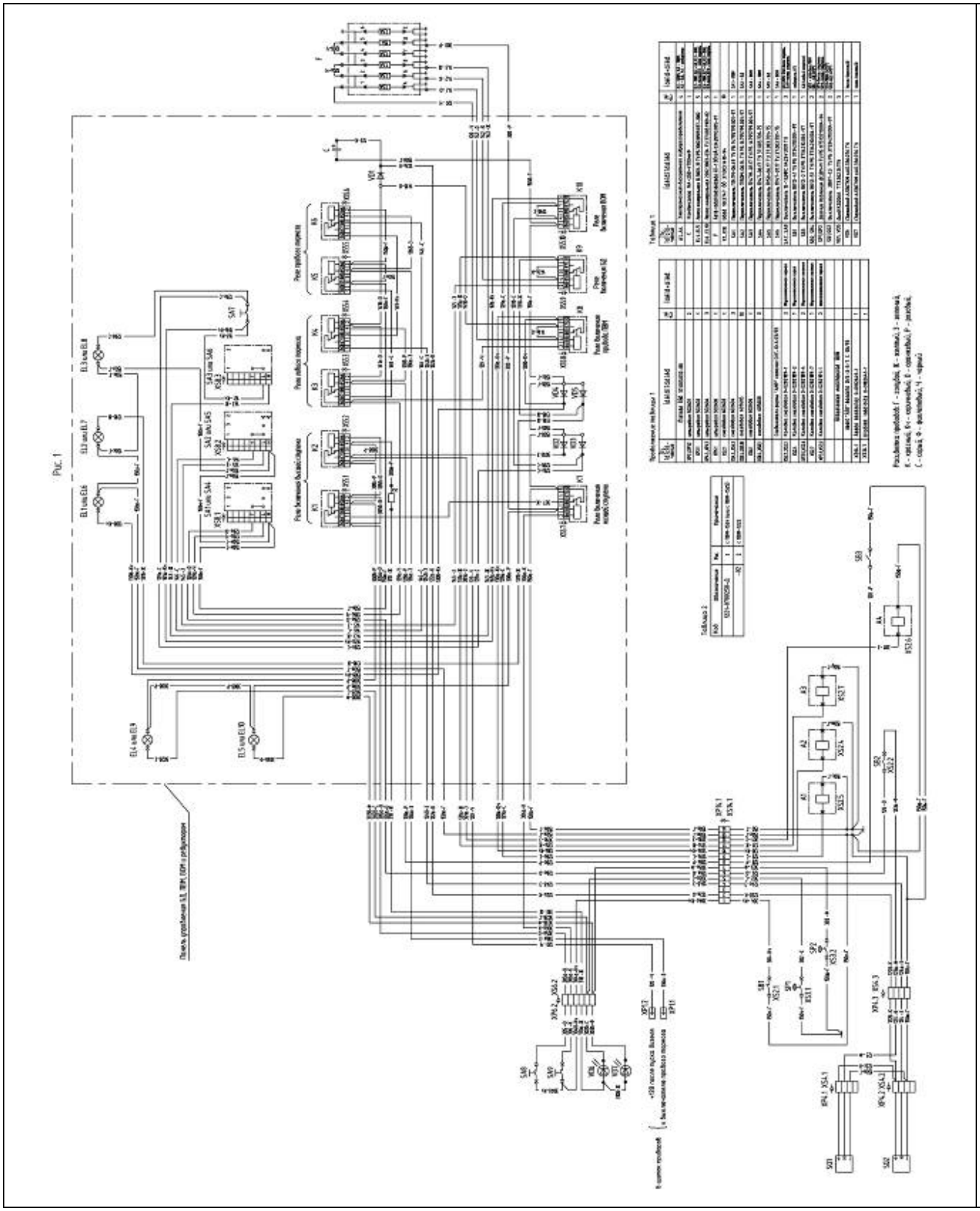


**Figure 11.16** Control system of DI, FDA, PTO and gear of BELARUS 1221 tractor

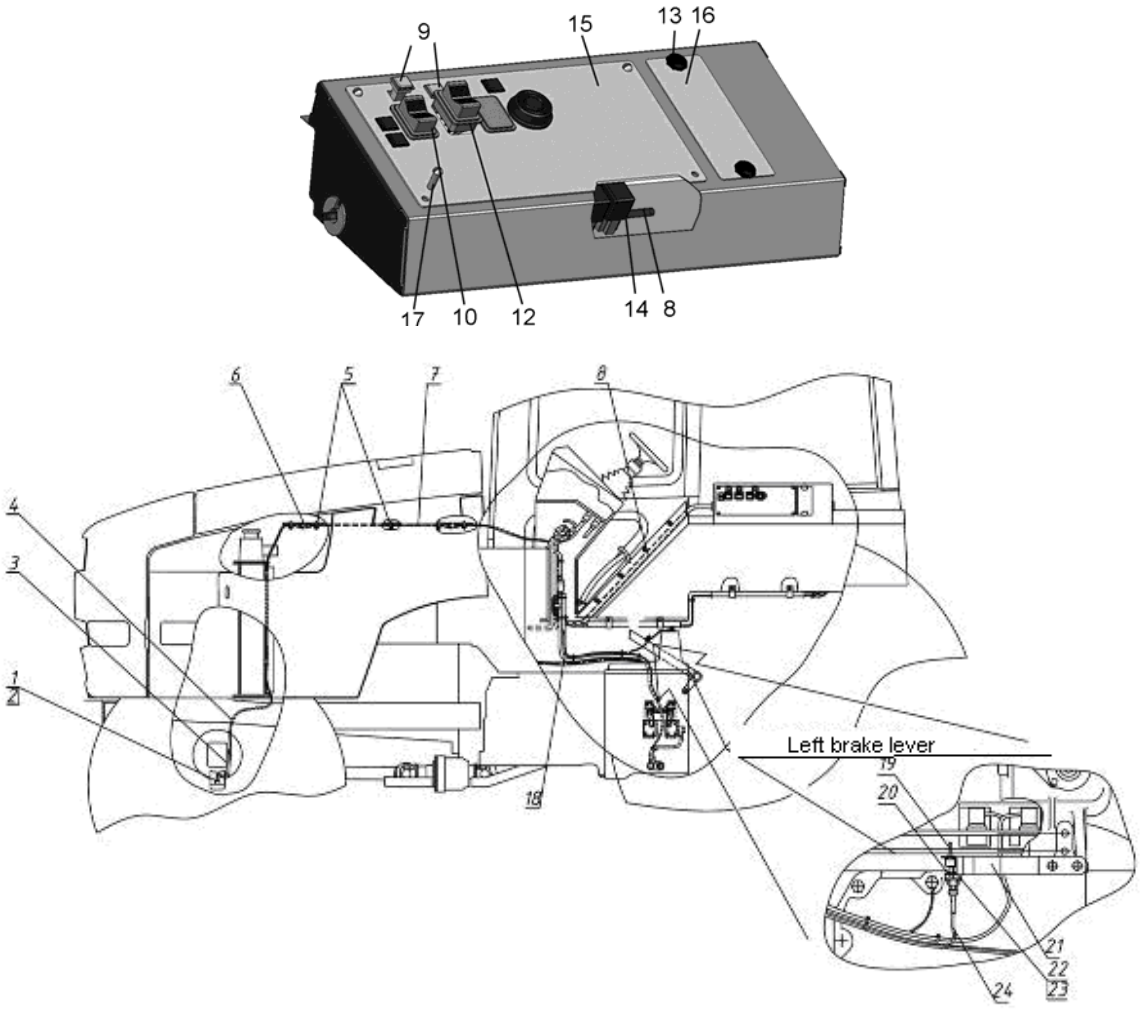
**11.8 Control of DI and FDA, MMZ or Deutz, (electrical part) mounted ontractors BELARUS 1221.4**

**To replace switch ВК 12-51** (sensor of turn angle of drive wheels), mounted on FDA left side (during forward movement of tractor) do the following:

a) turn drive wheels to the end left (right) side to the end;

b with diesel shut down disconnect harness cornector 4 (Figure 11.17) from switch 2;

c) using wrench unscrew switch 2 from seat in FDA beam, remove adjustment shims 1.




1 – adjustment spacer; 2 – switch ВК 12-51; 3 – pipe; 4 – harness fir FDA and switch ВК 12-51; 5 – gasket; 6 – pin carrier socket; 7 – harness for engine; 8 – harness for cabin; 9, 11 – control lamp; 10 – FDA switch; 12 – DI switch; 14 – relay; 15 – panel; 16 – cover; 17 – screw; 18 – transmission harness 19 – lever; 20 – sensor of left-side brake (switch 12-21); 21 –arm; 22-nut; 23- washer; 24 – harness to sensor of left-side brake..

**Figure 11.17** Control of DI and FDA (electrical part) mounted on tractors BELARUS-1221.4

Installation of new switch ВК 12-51 is made in reverse order.

Torque of switch 2 - (45±5) Nm.

Number of adjustment spacers (1) is provided by adjustment of switch actuation (2). Actuation of switch (2) (contacts opening) must take place when drive wheels turn to angle over (13±2)° to any side (decrease of the number of adjustment spacers leads to reduction of switch actuation angle). With position of drive wheels corresponding to straight movement, contacts of switch (2) must be closed (extension on lower axle of left-side FDA reduction gear presses switch ball). Lower axle of the left-side reduction gear differs from other ones by availability of lug. This axle must be mounted so that the lug was located along FDA axle (across the tractor). The availability of lug can be checked by means of screwdriver through threaded opening where switch (2) in FDA beam is installed.

**ATTENTION:** When lubricating bearing of lower left-side axle remember that bearing cavity is closed tightly, and building up of excessive pressure inside cavity when injecting grease leads to damage of switch ВК12-51.

**To replace harness (4) across FDA to switch ВК 12-51 (**sensor of turn angle if drive wheels**)** do the following**:**

a) disconnect terminals of harness (4) and (7),

b) remove pin carrier socket (6) from harness (4);

c) disconnect gaskets (5) for fastening harness (4),

d) pass the harness through pipe (3).

Install new harness in reverse sequence

**Replacement of switches, control lamps, relay, etc on the panel**

**To replace elements on panel (15) or cover for control of DI, FPTO and FDA (**switches 10, 12 and 21, control lamps 9, 11, 19, relay 14 and so on) do the following:

a) unscrew four screws (17) for fastening cover (16) and raise cover as an assembly with panel (15)

b) disconnect terminal of harness (8) from corresponding element;

c) remove the element from panel (15).

Installation of corresponding element is made in reverse sequence

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**11.8.1 Operations to be performed when replacing engine:**

a) on both sides disconnect connectors of engine harness (7) (from FDA harness (4) and from cabin harness (8));

b) dismount engine harness 7.

After replacement of engine install and connect harness (7) in reverse sequemce.

**11.8.2 Operations to be made when dismounting-mounting the cabin:**

a) before dismounting the cabin disconnect connectors of cabin harness (8) from engine harness (7) and transmission harness (18);

b) After mounting the cabin connect terminals of cabin harness (8) to engine harness (7) and transmission harness (18).

Replace harness of DI, FPTO and FDA control system according to diagram (Figure 11.18).

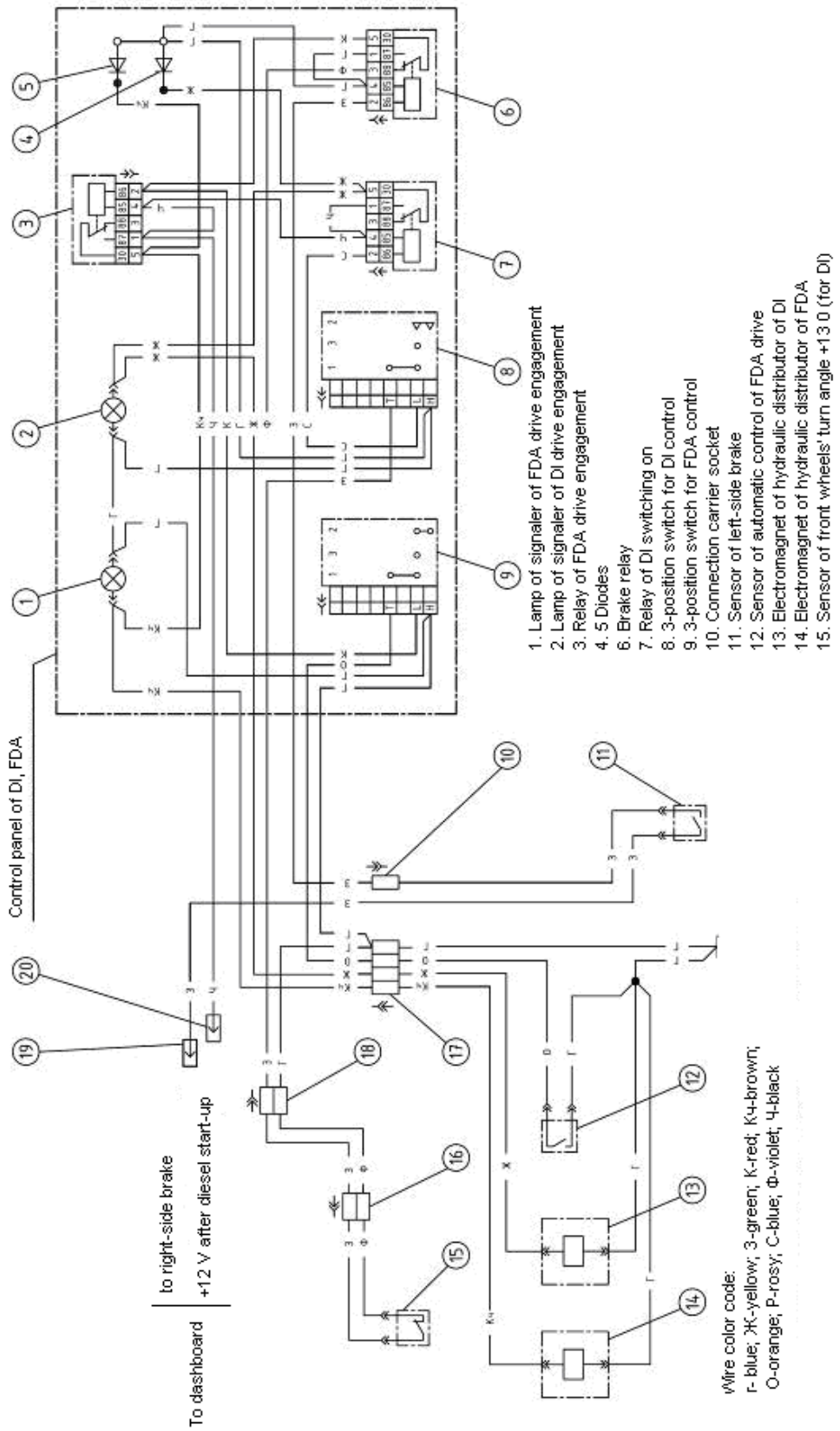



**Figure 11.18** Electric control system diagram of FDA and DI of rear axle of BELARUS 1221.4 tractor
(two brake sensors, sensor for left side pedal is additionally installed)

### 11.9 Control of engine Deutz 1221.4 – 8700910-Б, mounted on tractors BELARUS 1221.4

**To replace sensor 5 of cooling fluid level** do the following:

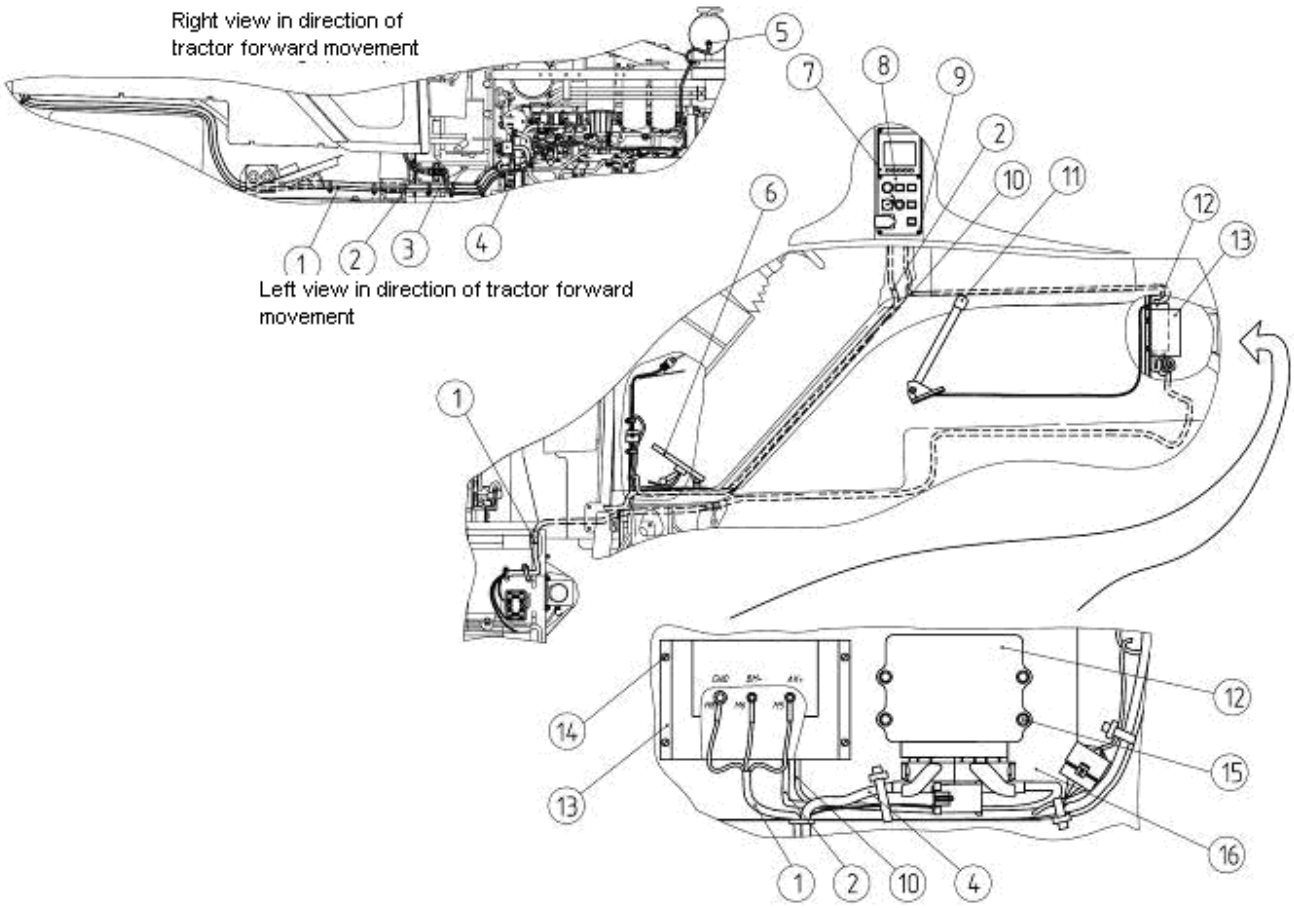
a) disconnect connector of harness 3 (Figure 11.19) from sensor 5;

b) unscrew sensor 5 from tank and remove ring.

When mounting new sensor 5 do the following:

a) screw sensor 5 inside tank threaded opening, having first placed under it new ring 013-017-25-1-4 State Standard GOST 18829-73/ GOST 9833-73 (torque 20…25 Nm);

b) connect connector of harness 3 to sensor 5.




1 – harness for power supply to switching and protection unit of series 1000; 2 – cabin harness; 3 – engine harness; 4 – harness for connection of engine with control electroninc unit; 5 – sensor of cooling fluid level; 6 – electronic pedal; 7 – information monitor; 8 – control panel; 9 – screws for fastening control panel; 10 – harness of socket and harness; 11 – sensor of manual fuel supply; 12 – electronic unit of engine control; 13 – unit of switching and protection of series 1000; 14 – screws for fastening unit of switching and protection of series 1000; 15 – bolts for fastening electronic unit of engine control; 16 – arm.

**Figure 11.19** Control of engine Deutz (electronic section)

**To replace engine control elements mounted on panel 8**, do the following:
a) extract sex screws 9 for fastening panel 8;
b)extract panel 8 with elements fixed to it and connected harness 2, 10 from seat on the right-side post plate;
c) disconnect connector of harness 2 or 10 from the corresponding element;
d) remove element from panel 8, where necessary, unscrew screws that fasten it to the panel;
e) mount new element on panel 8, where necessary, screw up screws that fasten it to panel;
f) connect to it connector of harness 2 or 10;
g) install panel 8 as an assembly with mounted elements and connected harness 2, 10 inside seat of the right-side post plate;
h) screw up screws 9 to fasten panel 8.

**To replace unit 13 of switching and protection of series 1000** do the following:

a) disconnect connectors of harness 2, 10 and tips of harness 1 from unit 13;
b) unscrew four screws 14 for fastening unit 13 to arm 16;
c) remove unit 13 from arm 16;
d) assembly everything with new unit 13 in reverse sequence.

**To replace electronic unit 12 of engine control** do the following:

a) disconnect connectors of harness 2, 4 from electronice unit 12;
b) unscrew four bolts 15 for fastening electronic unit 12 to arm 16;
c) dismount electronic unit 12;
d) assembly everything with new electronic unit 12 in reverse sequence.

**ATTENTION! Observe individual compliance of electronic unit with concrete engine ( No of electronic unit must correspond to No of engine).**

**11.9.1 Operations to be performed in replacing engine:**
a) on the site of engine disconnect connector of harness 4;
b) disconnect harness 3 from harness 2;
c) close to storage batteries disconnect tips of harness 1, also remove gaskets and collars that fasten harness .
After replacing engine make connection and fastening of harness in 1, 2, 3 and 4 in reverse sequence in and according to diagram.

**11.9.2 Operations to be performed when dismounting/mounting cabin:**
a) perform operations identical to those made when replacing engine;
b) release connector of harness 2 from its fastening to transmission in place where it abuts harness 3;
c) dismount gaskets and collars that fasten harness in 1 and 4 on transmission.
After mounting cabin make connection and fastening of harness in 1, 2, 3 and 4 in reverse sequence

### 11.10 Control of engine MMZ 1221.4 – 8700910-M, mounted on tractors BELARUS 1221.4

**To replace engine control elements mounted on panel 6**, do the following:

a) unscrew sex screws 9 for fastening panel 6;

b)extract panel 6 with elements fixed to it and connected harness 2, 10 from seat on the right-side post plate;

c) disconnect connector of harness 3 or 8 from the corresponding element;

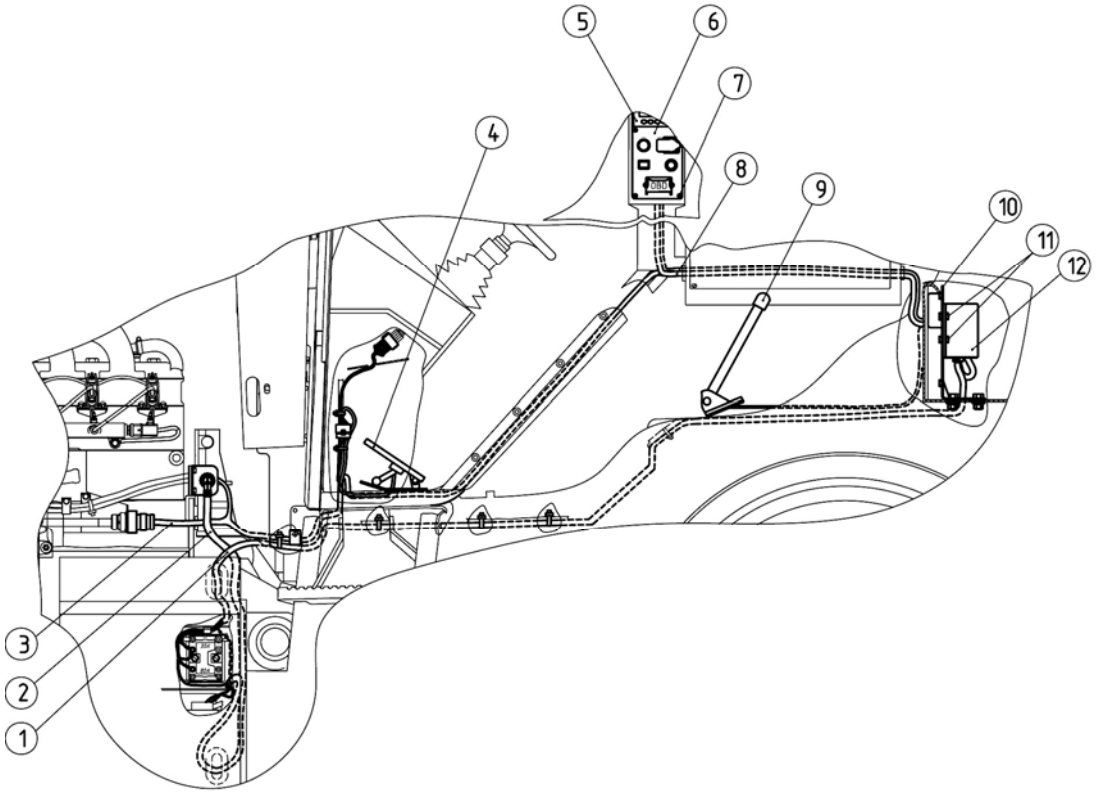
d) remove element from panel 6, where necessary, unscrew screws that fasten it to the panel;

e) mount new element on panel 6, where necessary, screw up screws that fasten it to panel;

f) connect to it connector of harness 3 or 8;

g) install panel 6 as an assembly with mounted elements and connected harness 3, 8 inside seat of the right-side post plate;

h) screw up screws 7 to fasten panel 6.




1 – harness for power supply to switching and protection unit of series 1000; 2 – cabin harness; 3 – engine harness; 4 – electronic pedal; 5 – information monitor; 6 – control panel; 7 – screws for fastening control panel; 8 – harness of socket and lighter; 9 – sensor of manual fuel supply; 10 – arml; 11 – screws for fastening unit of switching and protection of series 1000; 12 – unit of switching and protection of series 1000

**Figure 11.20** Control of engine MMZ (electronic section)

**To replace unit 12 of switching and protection of series 1000** do the following:

a) disconnect connectors of harness 3, 8 and tips of harness 1 from unit 12;
b) unscrew four screws 11 for fastening unit 12 to arm 10;
c) remove unit 12 from arm 10;
d) assembly everything with new unit 12 in reverse sequence.

**11.10.1 Operations to be performed in replacing engine:**

a) on the site of engine disconnect connector of harness 3;
b) disconnect harness 3 from harness 2 and disconnect connector of harness 3 that fastens it to arm;
c)in the storage batteries compartment disconnect tips of harness 1, and pull out harness from compartment;
d) remove gaskets and collars that fasten harness .
After replacing engine make connection and fastening of harness in 1, 2, 3 in reverse sequence and according to diagram.

**11.10.2 Operations to be performed when dismounting/mounting cabin:**
a) perform operations identical to those made when replacing engine;
b) dismount gaskets and collars that fasten harness in 1 and 3 on transmission.
After mounting cabin make connection and fastening of harness in 1, 2, 3 in reverse sequence

## 11.11 Dismounting-mounting and disassembly-assembly of dashboard

### 11.11.1 Dismounting-mounting of dashboard 80-3805010-Д1 mounted on tractors BELARUS-1221.2/1221B.2

a) dismount petticoat panels of control station, see section **8.5** “Disassembly-assembly of panels 85-6702550 on front cabin wall”;

b) disconnect from dashboard connectors 1 (Figure 11.21) on engine and transmission;

c) disconnect from carrier socket 2, dashboard harness the carrier socket of cabin roof harness;

d) remove plastic housing 3, having first unscrewed screws 4 that fasten it;

e) dismount under-steering wheel switch 5 together with housing 3, having first unscrewed screws 6 that fasten switch;

f) remove steering wheel 7;

g) ) dismount dashboard, having first unscrewed two bolts 8 that fasten it.

Mount the dashboard in reverse sequence.

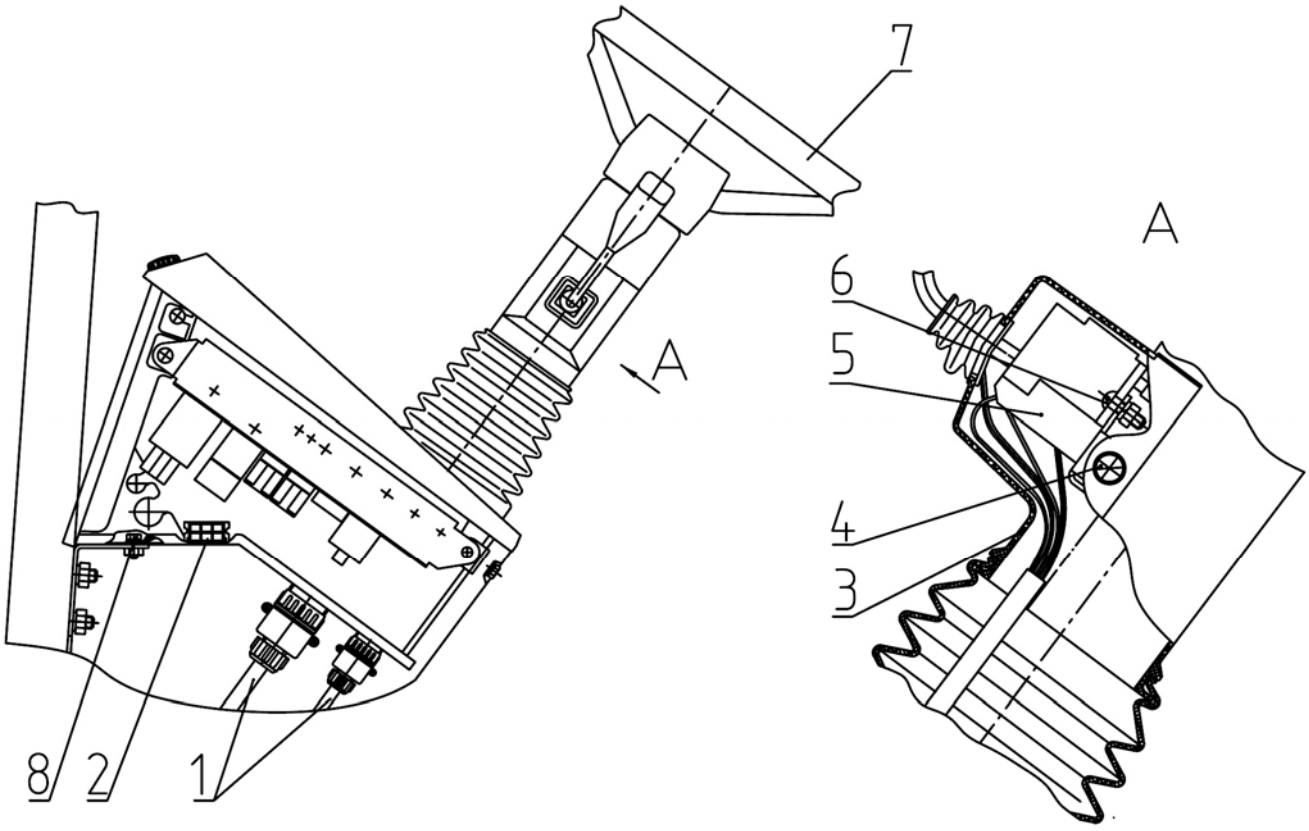



**Figure 11.21**

**Disassembly-assembly of dashboard:**

To completely disassembly dashboard first dismount it from tractor (see section **11.11.1** “Dismounting-mounting dashboard 80-3805010-Д1 mounted on tractors BELARUS-1221.2/1221B.2)” above, and then perform the following:

a) unscrew screws 1 (Figure 11.22), 2 and quick-dismounting screw 3;

b) unscrew screws 4, 5 that fasten panel to relay 6;

c) unscrew bolts 7 that fasten rear wall 8;

d) arrange the dashboard as shown in figure 11.23.

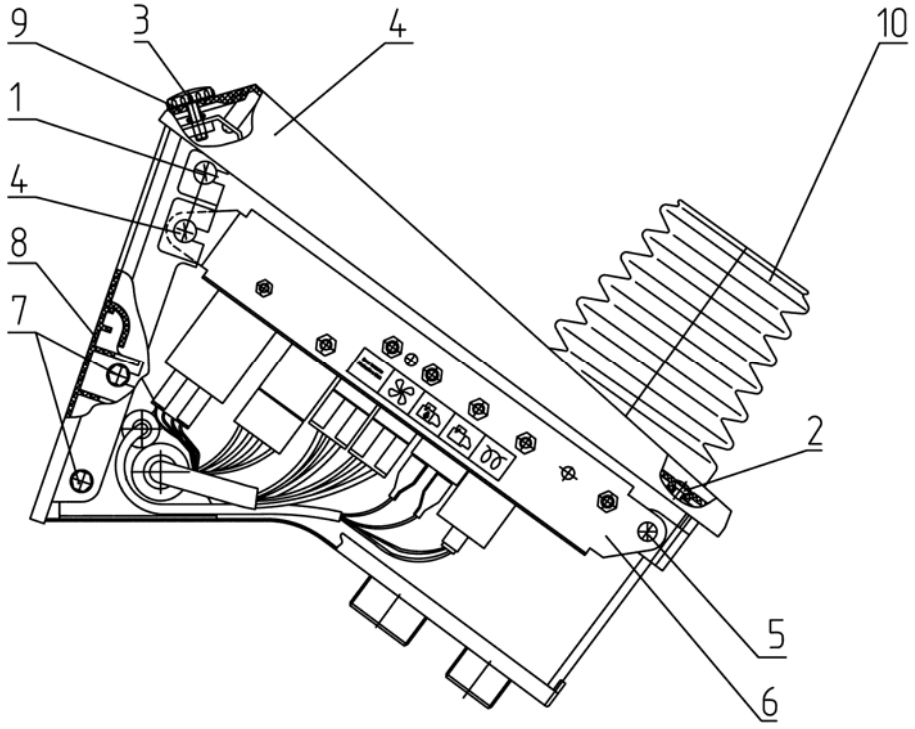



**Figure 11.22**

**To replace components** without dismounting dashboard (Figure 11.22), do the following:

a) to replace fuses flap cover 10 with block of fuses, having first unscrewed two quick-dismounting screw 3, remove cover from the needed block and replace fuse;

b) to replace cover 9 of box of fuses unscrew quick-dismounting screw 3, pull out of holders boxes of fuses and replace cover;

c) to replace relay mounted on bar 6, remove it having first unscrewed screws 4 and 5;

d) disconnect from bar 6 carrier sockets and wiring and replace relay by unscrewing screws that fasten it.

**IMPORTANT:** When mounting relays back in place and connecting wires and carrier sockets, strictly observe electrical wiring diagram.

e) to replace sealant 10 first unscrew screws 1 and 2, raise dashboard 4 and replace sealant;

**Replacing other components** see (Figure 11.23);

a) to replace boxes of fuses 1, 3, 4 disconnect wires from them, then extract boxes from fixing extensions of cover and replace them.

**ATTENTION**. When putting boxes of fuses back in place, strictly follow electric wiring diagram give in Operating manual» of this tractor.

b) to replace holder 5, of box of fuses 3, pull out the box from holder, unscrew screws 6 and replace holder. Install the box in reverse order;

c) to replace rear wall 7 first unscrew bolts 8, 9 that fasten the wall, unscrew quick-dismounting screw 3, (Figure 11.22) and then remove the wall;

d) to replace relay 10 (Figure 11.23) of manual brake lamp, disconnect from it wires and replace relay.

**ATTENTION:** When connecting wires anew follow electrical wiring diagram given in the operating manual of this tractor.

e) to replace harness 15, 16, 17 first disconnect harness wires from elements, unscrew clamps that fasten harness, unscrew screws that fasten connectors and replace harness.

**ATTENTION:** When connecting harness wires to dashboard elements follow electrical wiring diagram given in the operating manual of this tractor.

f) to replace plate 13 unscrew nut 14 that fastens switch of starter 16 and replace the plate

g) to replace plug 20 slightly squeeze fastening extension of plug on the side of face surface of dashboard panel 21 and replace it;

h) to replace switch of starter 21 first disconnect wires from it, then unscrew nut 19, remove table 18 and replace switch. When mounting switch back in place strictly follow electrical wiring diagram.

i) to replace panel 22 for combined indicator control,disconnect from it harness carrier socket and replace indicator;

j) to replace key switches 21 disconnect carrier socket of harness or wires, connected to corresponding switch, then remove switches on the side of panel face surface of dashboard;

k) to replace combined indicator 22 disconnect from it two carrier sockets of harness, unscrew two nuts that fasten the device, remove retaining clamps, then extract indicator on the side of face surface of dashboard panel 21 and replace the indicator;

l) to replace sound alarm 25 disconnect from it wires of harness, then unscrew screw 26 with clamp 18 that fasten it, and replace the alarm;

m) to replace blocks of control lamps 27, 28 disconnect from them harness carrier sockets and wires, unscrew sex screws 29, remove arms, 30, 31, 32, which fatsen them, then remove and replace blocks.

**ATTENTION:** When connecting wires anew follow follow electrical wiring diagram given in the operating manual of this tractor.

n) to replace of combination of devices 33 unscrew nuts that fasten device, remove retaining clamps, then remove device on the face side of dashboard panel;

o)to replace switch of emergency alarm 26, disconnect from it harness carrier socket, then switch device on the side of face surface of dashboard panel 21 and replace it;

p) to replace dashboard 35 remove from it all components by having first disconnected carrier sockets and wires of harness. Then replace the dashboard.

**ATTENTION:** When mounting components back in place strictly follow follow electrical wiring diagram given in the operating manual of this tractor.

q) to replace relay 37 of road headlights disconnect from them harness carrier sockets, unscrew screws 36 and replace relay;

r) to replace the under-driving wheel switch 5 (Figure 11.21), remove bushing 38 (Figure 11.23), disconnect harness of switch from dashboard harness and replace the switch.

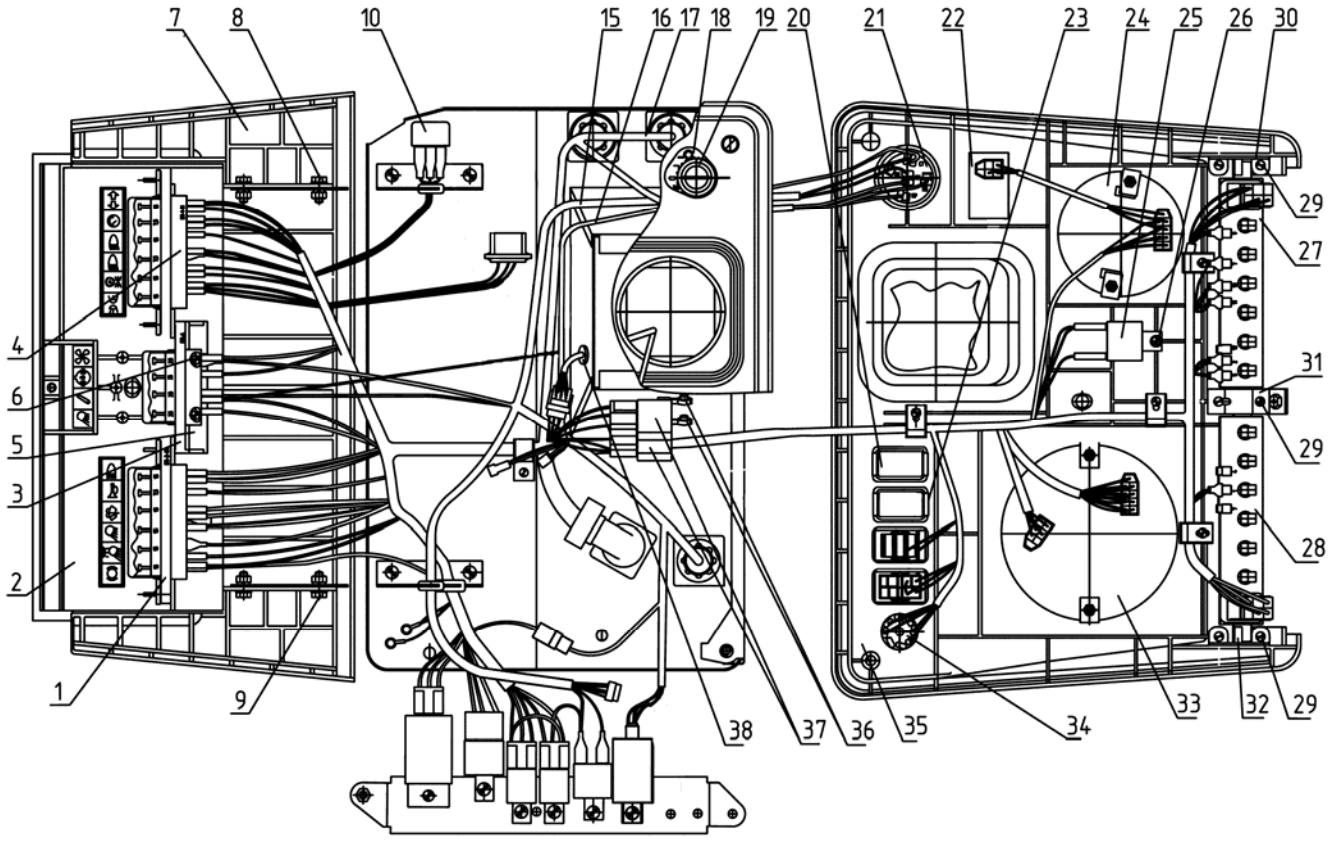



**Figure 11.23**

### 11.11.2 Dismounting of dashboard mounted on tractors BELARUS-1221.3/1221.4

a) dismount petticoat panels of control station, see section **8.5** “Disassembly-assembly of panels 85-6702550 on front cabin wall”;

b) disconnect from dashboard connectors 1 (Figure 11.21) on engine and transmission on the basis of dashboard;

c) disconnect from carrier socket 2, harness of operation headlights;

d) remove housing 3, having first unscrewed screws 4;

e) dismount under-steering wheel switch 5 from steering column, having first unscrewed screws 6with nuts 7 and washers 8;

f) remove steering wheel 7;

g) ) dismount dashboard, having first unscrewed two bolts 10 that fasten it.

Mount the dashboard in reverse sequence.

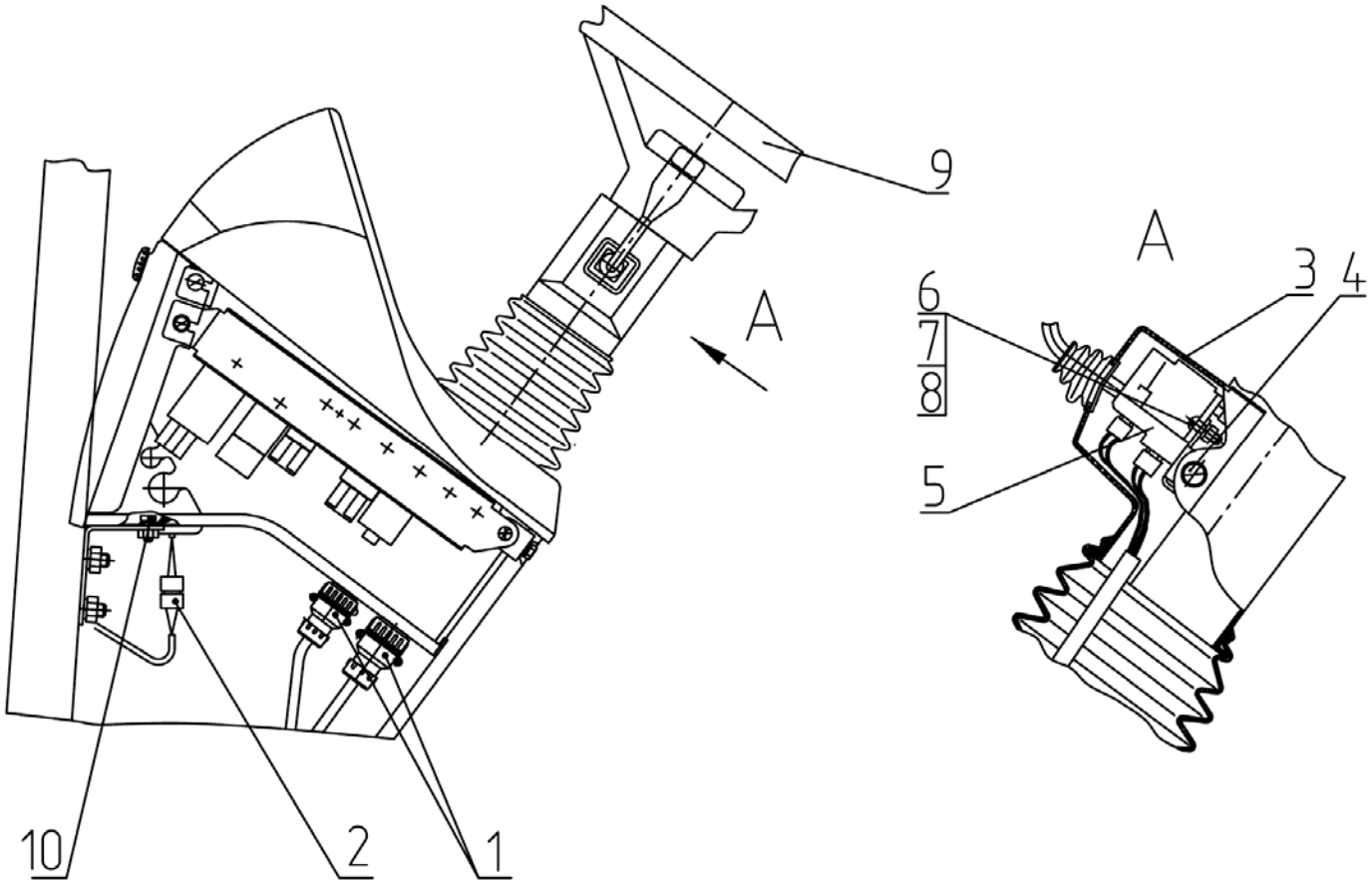



**Figure 11.24**

**Disassembly-assembly of dashboard**

To disassembly dashboard first dismount it from tractor (see section **11.11.2** «Dismounting-mounting dashboard mounted on tractors BELARUS-1221.3/1221.4.

**To completely disassembly dashboard do the following:**

a) unscrew two screws 1 (Figure 11.25), two screws 5, as well as and two quick-dismounting screw 9;

b) unscrew screw 8 that fastens panel 2 to relay;

c) unscrew four bolts 6 that fasten rear wall 7;

d) arrange the dashboard as shown in figure 11.26.

**Replacing components without dismounting dashboard:**

**To replace the under-steering wheel switch 5** (Figure 11.24) do the following:

a) dismount housing 3, having first unscrewed two screws 4;

b) unscrew fastening screws 6 with nuts 7 and washers 8;

c) disconnect from switch harness carrier socket and replace the switch 5.

**To replace fuses do the following:**

a) remove cover 10 (Figure 11.25) with boxes of fuses, but first unscrew two quick-dismounting screws;

b) remove cover from the required box and replace fuse;.

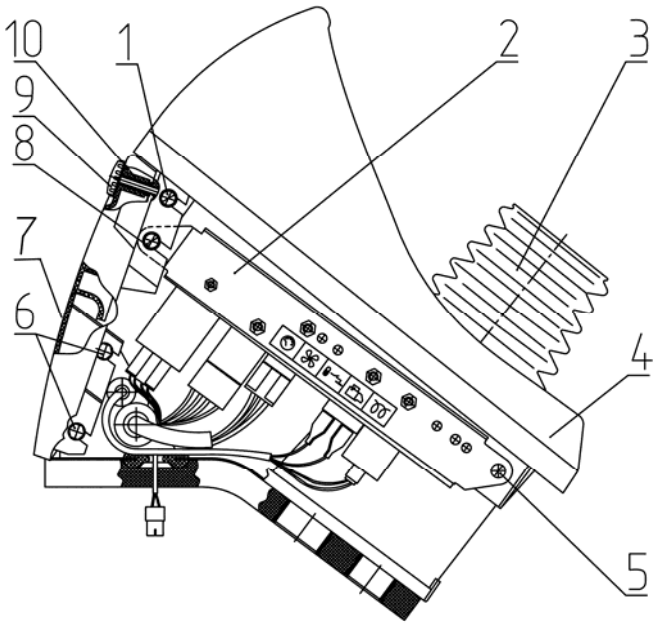



**Figure 11.25**

**To replace cover 10** of the box of fuses, do the following:

a) unscrew two quick-dismounting screws 9 (Figure 11.25);

b) unscrew two quick-dismounting screws (Figure 11.26), that fasten box of fuses;

c) replace three boxes of fuses and replace cover.

**To replace relay installed on bar 2** (Figure 11.25) do the following:

a) remove bar 2 and to do this:

1) unscrew screw 5 and screw 8, having disconnect from relay carrier socket and wires;

2) unscrew screws for fastening corresponding relays (one for each) and replace relay.

When mounting relay back in place and connecting wires and harness strictly follow electrical wiring diagram.

**To replace sealant 3** (Figure 11.25) unscrew two screws 4 and two screws 5 that fasten panel 4, and after that raise the panel and replace sealant.

**Replacing other components:**

a) to replace boxes of fuses 2, 3, 4 (Figure 11.26) disconnect wires from them, then unscrew screws 1 that fasten them and replace corresponding box

**ATTENTION**. When putting boxes of fuses back in place, strictly follow electric wiring diagram given in the operation manual of this tractor.

b) to replace rear wall 5 first unscrew four bolts 6 that fasten it, and replace the wall;

c) to replace resistor for feeding generator 7 disconnect wires from it, then unscrew two screws 8 and replace the resistor.

**ATTENTION**. When replacing resistor strictly observe its orientation.

d) to replace sound signal relay 9 first unscrew screwт 10 that fastens relay, then remove harness carrier socket from it, and replace the relay;

e) to replace harness 11, 12 disconnect harness wires from elements, unbend clamps that fasten harness, unscrew four screws that fasten harness, unscrew four screws that fasten connectors and replace harness.

**ATTENTION:** When connecting wires of harness to dashboard elements, strictly follow electrical wiring diagram given in the operation manual of this tractor.

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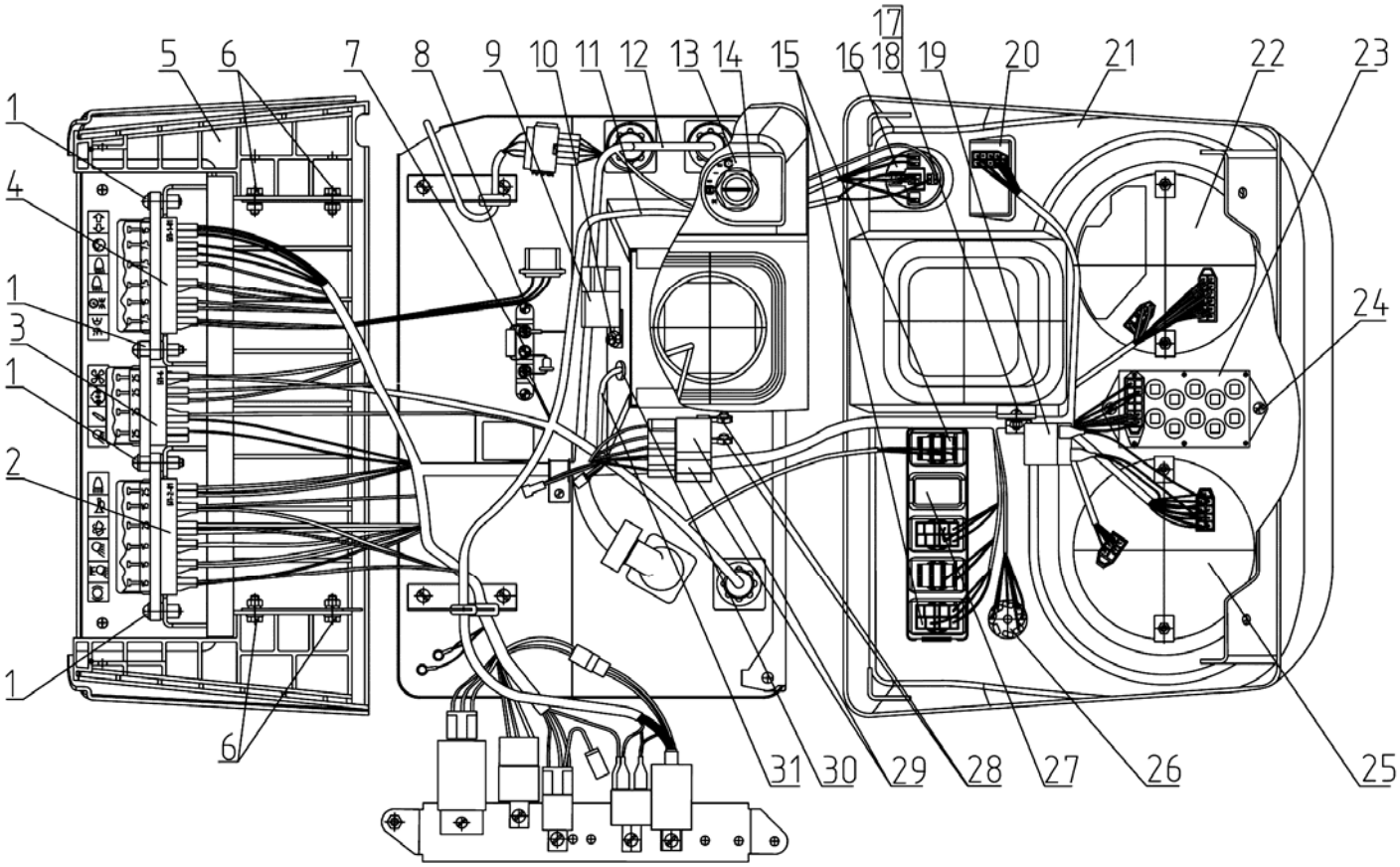


**Figure 11.26**

f) to replace plate 13 unscrew nut 14 that fastens switch of starter 16 and replace the plate;

g) to replace key switches 15 disconnect carrier socket of harness or wires, connected to corresponding switch, then remove switches on the side of panel 21 face surface of dashboard, and replace them;

h) to replace switch of starter 16 disconnect from it two carrier sockets with wires, then unscrew nut 14, remove plate 13 and replace the switch;

i) to replace sound alarm 19 disconnect from it wires of harness, then unscrew screw 17 with clamp 18 that fasten it, and replace the alarm;

j) to replace control panel 20 for combined indicator, disconnect from it harness carrier socket, then dismount panel on the side of face surface of dashboard panel 21, and replace the panel;

k) to replace combined indicator 22 disconnect from it two carrier sockets of harness, unscrew two nuts that fasten the device, remove retaining clamps, then extract indicator on the side of face surface of dashboard panel 21 and replace the indicator;

l) to replace block of control lamps 23 disconnect from it harness carrier socket, unscrew two screws 24, then remove block from dashboard panel 21 and replace it;

m) to replace set of devices 25 disconnect from it two carrier sockets of harness, unscrew two screws that fasten the device, remove retaining clamps, then remove device on the side of face surface of dashboard panel 21 and replace it;

n) to replace switch of emergency alarm 26, disconnect from it harness carrier socket, then remove switch device on the side of face surface of dashboard panel 21 and replace it;

o) to replace plug 27 slightly squeeze fastening extension of plug on the side of face surface of dashboard panel 21 and replace it;

p) to replace two relays 29 of road headlights, disconnect from them harness carrier socket, unscrew screws 28 that fasten relay, and replace the relay